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ISSUED UNDER THE DIRECTION OF THE HONORARY MANAGING COMMITTEE.

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ERRATA.

Vol. 30, No. 1, p. 4, KERR summary, lines 4–5. The words "after an extrinsic incubation period of 12 to 18 days" should be deleted.

Vol. 30, No. 5, p. 295, WIGGLESWORTH summary, 3rd line from bottom, *for* 74°C. *read* 24°C.

Vol. 30, No. 5, p. 324, BALOZET summary, line 3 of title, *for* Skin Puncture *read* Spleen Puncture.

Vol. 30, No. 6, p. 354, STEPHANOPOULO summary, line 2, *for* 16 passages in mice, *read* 161 passages in mice.

Vol. 30, No. 9, p. 608–9, GIBBINS summary. The statement that *A. mauritianus* var *ziemanni* showed an infection rate of 0·3 to 0·5 per cent. is incorrect. This species was *not* incriminated in the natural transmission of malaria.

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

Vol. 30.] 1933. [No. 1.

YELLOW FEVER.

JOHNSON (W. B.). **Recent Advances in the Knowledge of Yellow Fever.**—*Brit. Med. Jl.* 1932. Aug. 13. pp. 285–288. [14 refs.] Discussion pp. 324–325.

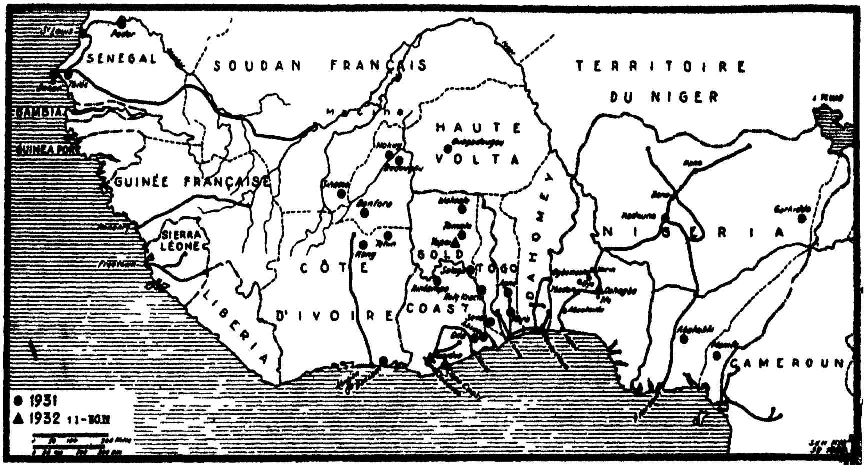
A general summary of the pathology and epidemiology of the disease with special reference to the work of the Rockefeller Commission in West Africa. Of special interest are notes showing that the dry northern regions of Nigeria are both infectible and also able to maintain infection throughout the year. The methods of attacking the disease in West Africa are based upon the following lines .—Institution of pipe-borne water ; education in hygiene by means of lectures and newspaper articles , training African sanitary and medical personnel and their dissemination throughout the country.

The discussion centred largely around the application of recent studies on yellow fever to measures for its control, including the agreement for controlling the spread of infectious disease by aircraft. Col. F. P. MACKIE, I.M.S., mentioned mouse protection experiments with 53 sera collected by Col. KING in Madras ; out of these five gave some degree of protection, including two definitely positive sera.

E. Hindle.

LEAGUE OF NATIONS MONTHLY EPIDEMIOLOGICAL REPORT. 1932. Mar.–Apr. Vol. 11. No. 3–4. pp. 79–82. **Yellow Fever since the Beginning of 1931.** [In parallel French & English.]

The reappearance of yellow fever in West Africa during 1931 in a number of scattered localities with no connexion between them (see Fig.) can only be explained on the supposition of latent yellow fever foci in these countries during the intervals between epidemics, and the experiments carried out in Nigeria and Sierra Leone by means of protection tests [see this *Bulletin*, Vol. 28, p. 283] support this view. In Sierra Leone, which used to be considered one of the worst foci of yellow fever, no cases have been reported since 1910; yet in protection tests in 1929 on 34 children between 4 and 10 years of age, one gave complete and three partial protection, showing that the disease was still present.



Localities of Western Africa in which Yellow Fever cases were reported in 1931 and during the first four months of 1932. [According to BOYÉ (below) Yellow Fever cases have also occurred in 1931 at Korango and Kayo (French Soudan) and at Dosso (French Niger Territory).]

[Reproduced from the *League of Nations Monthly Epidemiological Report.*]

The recrudescence of the disease in Brazil, particularly in Ceara, and on the coast of Colombia, near Cierraga, is also evidence of its persistent nature. The number of cases in both Africa and America is very small, but epidemiological observations indicate that the cases notified have no numerical value, but only an index value. The widely scattered localities from which the cases have been recorded are a clear indication of the potential danger of this disease. *E. H.*

BOYÉ. Les cas déclarés de fièvre jaune chez des Européens en Afrique Occidentale Française en 1931. [**Notified Cases of Y. F. among Europeans in French West Africa during 1931.**]—*Bull. Office Internat. d'Hyg. Publique.* 1932. June. Vol. 24. No. 6. pp. 943-947. With 1 map.

During 1931, cases of yellow fever have occurred in Togoland and in six out of the nine French colonies in West Africa, viz.: Ivory Coast, Upper Volta, Soudan, Senegal, Niger Territory and Mauritania. A total of 40 cases in Europeans was observed of whom 33 died. The cases occurred from June to December, the highest number being in July (16). It is proposed to establish a special laboratory in French West Africa for the scientific diagnosis of suspicious cases, and also to continue the delimitation of endemic areas. *E. H.*

HUGHES (T. P.) & SAWYER (W. A.). **Significance of Immunity Tests in Epidemiology as illustrated in Yellow Fever.**—*Jl. Amer. Med. Assoc.* 1932. Sept. 17. Vol. 99. No. 12. pp. 978-981. [11 refs.]

Using the intraperitoneal protection test in mice the authors have examined the sera of a number of persons from countries where yellow fever has never existed in order to test the specificity and reliability of the test. The sera of 88 Chinese aged from 21 to 53 living in Peiping, who had never been out of China, all gave negative results with the exception of a few inconclusive ones. Out of 109 Canadian residents, one serum gave protection because of some property in the serum itself and five gave inconclusive results. The remainder were all negative. On the other hand the sera of 21 persons of the same British stock, who had either recovered from yellow fever or been immunized by vaccination, all gave complete protection. The sera of 20 American negroes from near Annapolis gave no protection in 19 and inconclusive results in one. Ninety-six sera from Panama and the Canal Zone gave complete protection in 14 cases, 5 inconclusive and 77 no protection. All the sera giving protection came from persons of 30 years of age or older. None of the 55 sera from persons under 30 years of age gave protection, which agrees with the history of yellow fever in the Isthmus, the last case having been recorded in 1905. It is evident that this test is highly specific and furnishes a very useful indicator of past infections.

E. H.

DURIEUX (C.). Mission d'enquête amarile au Niger et au Dahomey. [**Yellow Fever Mission to French Niger and Dahomey.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 834-836.

The examination of sera for protection against yellow fever at Zinder gave 44 per cent. positive (actual numbers not given) among the adults but all negative among children, the youngest positive case being 17 years of age. At Tessaoua there were 48 per cent. positive, the youngest aged 12 years. At Agadès the sera (86) were all negative, except that of a child who may have visited other districts. *E. H.*

SOPER (Fred L.), FROBISHER (M.), Jr., KERR (J. A.) & DAVIS (N. C.). **Studies of the Distribution of Immunity to Yellow Fever in Brazil. I. Postepidemic Survey of Magé, Rio de Janeiro, by Complement-Fixation and Monkey-Protection Tests.**—*Jl. Preventive Med.* 1932. Sept. Vol. 6. No. 5. pp. 341–377. With 5 figs. [34 refs.]

Using an antigen prepared from the livers of monkeys infected with yellow fever, the authors made complement fixation tests on 300 sera collected in Magé and Santo Aleixo, and on 101 samples from Piracicaba, lying outside the yellow fever zone. Approximately 42 per cent of the sera from Magé county were positive as compared with only 3 per cent. of those from Piracicaba. A small number of tests made on the same individuals at intervals of four, sixteen and twenty-two months after an epidemic, seemed to indicate that there is a tendency, especially the first year after infection, for the titre of the complement-fixing bodies in the blood to decrease.

Comparative results of complement fixation and monkey protection tests with 76 sera showed that as a rule positive sera give complete protection, but about 13 per cent. showed a negative reaction and yet gave protection. It would seem that the complement-fixing bodies are less constantly produced and also less permanent than the protection bodies. It is of interest that a patient who had yellow fever in April 1929, and failed to react clinically to repeated feedings of infected mosquitoes over a period of eighteen months, gave the following results in monkey protection tests during 1929—May and July, prevented death but not fever; September, no protection; October, full protection; November, severe fever and recovery; December, full protection.

The results of the tests indicate that at the time of the outbreaks of yellow fever in Magé and Santo Aleixo a relatively large percentage of the inhabitants acquired immunity without any apparent attack of the disease, a factor which must be taken into account in any study of the distribution of the disease.

The influence of variations in metabolism and diet on the course of the infection is considered a possibility in view of the protective action of certain food substances against liver destruction caused by such poisons as carbon tetrachloride and chloroform. In this connexion some of the highest death rates have been obtained in closed groups which had been subjected to uniform diets probably well below optimum. *E. H.*

MONTEIRO (J. Lemos) & TRAVASSOS (J.). Diagnostico sorologico da febre amarella. Sobre a reacção de fixação do complemento. [**Serological Diagnosis of Y. F.: Complement Fixation.**]—*Mem. Inst. de Butantan.* 1930. Vol. 5. pp. 173–191. With 1 graph. English summary.

By means of complement fixation [see this *Bulletin*, Vol. 27, p. 878] using yellow fever liver antigen, a number of sera of Brazilians have been tested. The sera of natives living in endemic areas were found to contain complement fixing antibodies in about 50 per cent. of the cases, whilst those of newly arrived foreigners were negative. The sera giving complement fixation were also found to protect rhesus monkeys against the infection. *E. H.*

LEFROU (G.). Vieux documents sur l'examen des urines dans la fièvre jaune. [**Old Records of the Examination of Urine in Y. F.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 535–539.

The author calls attention to the work of earlier writers on this subject, especially DA COSTA ALVARENGA who wrote an account of the Lisbon epidemic in 1857, and called attention to the importance of albuminuria in the diagnosis and prognosis of yellow fever. DECOREIS also gave an excellent account of the changes in the urine based on a study of the epidemic at St. Pierre (Martinique) in 1880 and 1881.

E. H.

KERR (J. A.). **Studies on the Transmission of Experimental Yellow Fever by** *Culex thalassius* **and** *Mansonia uniformis.*—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 119–127. [12 refs.]

Culex thalassius, which occurs throughout the coastal zone of tropical and South Africa, breeds in a great variety of places, including the shallow brackish or salt water at the edges of lagoons. The author finds that it is capable of transmitting yellow fever by its bite after an extrinsic incubation period of 12 to 18 days and remains infective for 27 to 49 days after the infecting meal. As the density of this species is known to be very great at certain places on the coast it may be of some significance in the epidemiology of yellow fever.

Mansonia (Mansonioides) uniformis seems to be unable to transmit the virus of yellow fever by its bite, after an extrinsic incubation period of 21 days or less, but the virus is able to persist in the body of the insects for at least 24 days and possibly throughout their lives; consequently it cannot be entirely excluded as a possible factor in places where it is abundant. *E. H.*

KUMM (Henry W.) & FROBISHER (Martin), Jr. **Attempts to transmit Yellow Fever with Certain Brazilian Mosquitoes (Culicidae) and with Bedbugs** (*Cimex hemipterus*).—*Amer. Jl. Trop. Med.* 1932. Sept. Vol. 12. No. 5. pp. 349–361. [14 refs.]

Culex corniger, *C. coronator*, and *C. surinamis*, in captivity, would not bite either human beings or monkeys. *Joblotia digitata* was fed with difficulty on infected monkeys, and the only two specimens known to have engaged on blood containing yellow fever virus failed to infect or immunize normal monkeys injected with their contents after intervals of 14 and 20 days respectively. *Mansonia titillans* fed on infected monkeys was apparently incapable of transmitting yellow fever by bite, but the virus remained alive and monkeys inoculated with the contents of mosquitoes at various intervals up to a maximum of 30 days after the infecting meal, all became infected and died of the disease.

When bed-bugs, *Cimex hemipterus*, were fed on yellow fever monkeys, the virus died off so rapidly that the contents failed to produce infection later than the second day after the infecting meal. It is just possible that the faeces contained active virus during the first and second days, but not later; consequently the authors are unable to confirm the results of MONTEIRO [see this *Bulletin*, Vol. 27, p. 485]. *E. H.*

KERR (J. A.) & HAYNE (T. B.). **On the Transfer of Yellow Fever Virus from Female to Male** *Aedes aegypti*.—*Amer. Jl. Trop. Med.* 1932. May. Vol. 12. No. 3. pp. 255–261.

A careful series of experiments testing the possibility of the transfer of yellow fever virus from infected females to normal males of *Aëdes aegypti*. Large numbers of mosquitoes were used and the males brought in contact with the females immediately, three weeks and nine weeks after they had taken infecting blood meals. Infectivity tests with 152 of these males gave no evidence indicating the presence of yellow fever virus and the results of immunity tests confirmed these results. It is evident, therefore, that the transfer of yellow fever virus from mosquito to mosquito without passage through a vertebrate host, is of no importance in the epidemiology of yellow fever [see also this *Bulletin*, Vol. 28, p. 285]. *E. H.*

DAVIS (Nelson C.). **The Effect of Various Temperatures in modifying the Extrinsic Incubation Period of the Yellow Fever Virus in** *Aëdes aegypti*.—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 163–176. With 1 chart. [11 refs.]

An account of experiments confirming previous observations [see this *Bulletin*, Vol. 28, p. 285] on the influence of temperature on the development of yellow fever virus in *Aëdes aegypti*. The Asibi (West African) strain of virus and a South American race of mosquitoes were used throughout. Ability to infect was acquired after four days at 37°C.; after five days at 36°C.; and after six days at 31°C.; after eight days at 25·1°C.; and at 23·4°C. they were infective after eleven, but not after nine days. At 21°C. they became infective after eighteen days. When kept at 18°C. they were not infective after thirty days, but after an additional six days at room temperature (23·4°C.) became infective, showing that there had been some development of the virus, or progression towards infectivity, even at the lower temperature.

There was no attenuation of the virus in mosquitoes at low temperatures for, even after storage at 8°C., they became infective when placed at 36°C. for six days. The author re-examined the protocols of FINLAY'S total of 103 experiments in which he claimed to have proved the transmission of yellow fever by the bites of mosquitoes. In only two experiments, where transmission was claimed, had the mosquitoes received their infective meal from patients as early as the third day of fever, and in both these instances the volunteers for the experiments were bitten after an incubation period in the mosquito of only two days. Even with the most favourable interpretation it is impossible to admit transmission to any of his experimental subjects, unless some of the wild mosquitoes he used had been previously infected in nature. *E. H.*

KUMM (Henry W.). **Yellow Fever Transmission Experiments with South American Bats.**—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 207–213.

Since *Aëdes aegypti* readily feeds on bats the possibility of these animals serving as a reservoir of yellow fever virus has been investigated. Attempts to transmit the disease to *Molossus obscurus* Geoffroy, a common bat in houses in Bahia, and *Desmodus rotundus* Geoffroy, a common vampire bat of South America, by means of the bites of infected mosquitoes, and later to reobtain the virus, gave entirely negative results. In two experiments, when vampire bats were allowed to bite an infected monkey and after about one minute's interval bit a normal monkey the latter became infected with yellow fever. Such mechanical transmission has probably little importance in the epidemiology of the disease in human beings, but in the case of animal diseases may be of economic importance. *E. H.*

SELLARDS (A. W.) & LAIGRET (J.). Contrôle, par épreuve sur *Macacus rhesus*, du pouvoir protecteur du sérum des hommes vaccinés contre la fièvre jaune avec le virus de souris. [**Control Tests with *M. rhesus* on Protective Value of the Serum of Human Cases Vaccinated against Y. F. with Mouse Virus.**]—*C. R. Acad. Sci.* 1932. June 13. Vol. 194. No. 24. pp. 2175–2178.

The blood of three patients vaccinated with small doses of mouse virus [see this *Bulletin*, Vol. 29, p. 572], has been tested in rhesus monkeys and found to possess a high degree of immunity, not only against mouse virus, but also against the ordinary human virus maintained by passage in monkeys. *E. H.*

SAWYER (W. A.), KITCHEN (S. F.) & LLOYD (Wray). **Vaccination against Yellow Fever with Immune Serum and Virus fixed for Mice.**—*Jl. Experim. Med.* 1932. June 1. Vol. 55. No. 6. pp. 945–969. With 1 text fig. [24 refs.]

A valuable account of experiments on the method of vaccination against yellow fever by the use of immune serum and mouse virus.

Experiments with virus exposed to the action of formaldehyde or tricresol showed that mixtures exposed for only a short time to the attenuating agents produced yellow fever in the monkeys inoculated, and those exposed for a long time did not protect. Between these extremes vaccinated animals were found to be immunized without showing any fever, but the zone of exposure to the attenuating agent was found to be inconstant and narrow. It is well known that a simultaneous injection of virus and immune serum confers protection without producing any signs of infection, and this method was finally adopted as the most satisfactory, using mouse virus instead of the more virulent monkey strain. Virus mixed with immune serum was found to be slowly neutralized at room temperatures but this process was stopped by drying and a mixture kept dry in a sealed tube at room temperature for eight months retained its immunizing power. When yellow fever virus is completely neutralized by immune serum *in vitro* it loses its power to immunize or infect. The degree of immunity produced by the inoculation of mouse virus and immune serum was found to be almost as high as that following the naturally acquired disease. It was necessary, however, not to use an excessive quantity of immune serum as this greatly diminishes and possibly prevents the production of antibodies in the blood after injections of virus.

The method finally adopted was a single injection of a dried mixture of living yellow fever virus fixed for mice, and human immune serum, with separate injections of enough additional serum to make up the amount required for protection. The amount of virus used was generally 0·003 gm. per kilo body weight, and the total amount of immune serum 0·3 cc. per kilo body weight. This method has been tested in 15 patients whilst another was similarly protected by injecting the serum and virus separately.

By the titration in mice of the sera of vaccinated persons it was shown that the immunity rose to a height comparable to that following an attack of yellow fever, and remained there for at least six months. The virus could not be recovered from the blood of vaccinated persons or monkeys, except when the amount of immune serum was less than the minimum effective amount ; nevertheless, the immunizing reaction seems to be part of a true infectious process and is accompanied by a characteristic leucopenia. *E. H.*

MONTEIRO (J. Lemos) & TRAVASSOS (J.). Sobre a duração da actividade do antigeno para a reacção de fixação do complemento na febre amarella. [**Keeping Qualities of an Antigen for the Complement Fixation Reaction in Y. F.**]—*Brasil-Medico.* 1932. July 2. Vol. 46. No. 27. pp. 597–599. English summary.

" In a previous paper it was shown that the verification of both experimental yellow fever and immunity of persons having had the natural infection and living in endemic zones can be based on the complement fixation reaction. This reaction may take the place of the proof of protection of *rhesus* monkeys by means of immune serum, a process that is much more costly and tedious.

" The result of those previous experiments has recently been confirmed in regard to a few samples of sera received from Argentina for diagnosis, the antigen used having been prepared from the liver of infected *rhesus* nearly two years ago (21 months).

" Having thus retested several samples of sera previously examined, the authors found that the complement fixation power of their yellow fever antigen in the presence of immune sera has not changed for nearly two years and seems to have become somewhat strengthened." *H. H. S.*

STEFANOPOULO (G.) & CALLINICOS (G.). Absence d'anticorps pour le virus amaril dans le sang des sujets atteints de dengue. [**Absence of Y. F. Antibodies in Blood of Dengue Patients.**]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1230–1231.

The authors made yellow fever protection tests in mice with the sera of eleven patients who had recovered from severe attacks of dengue in Greece. None of the sera gave any protection, whilst control mice inoculated with mixtures of the virus with either convalescent yellow fever serum or the serum of a horse immunized against this disease, were all protected. *E. H.*

WAKEMAN (A. Maurice) & MORRELL (Clare A.). **Chemistry and Metabolism in Experimental Yellow Fever in** *Macacus rhesus* **Monkeys. V. Acid-Base and Electrolyte Equilibrium.**—*Arch. Intern. Med.* 1932. May. Vol. 49. No. 5. pp. 826–835. With 3 charts in text. [15 refs.]

The concentration of proteins in the serum of monkeys was found to diminish during the course of infection with yellow fever, the reduction being mainly at the expense of the albumin fraction. In the early stage of the disease there was a rise in the globulins. Towards the end of the infection, serum bicarbonate is generally reduced, often considerably, the reduction being due chiefly to accumulation of acids, probably organic, and of inorganic phosphate. No characteristic alterations were found in the concentrations of base and chloride in the serum or in the urinary excretion of chloride. *E. H.*

HAAGEN (E.) & THEILER (M.). Untersuchungen ueber das Verhalten des Gelbfiebervirus in der Gewebekultur. Mit besonderer Berücksichtigung seiner Kultivierbarkeit. [**Behaviour of Y. F. Virus in Tissue Culture.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Aug. 3. Vol. 125. No. 3/4. pp. 145–158. With 3 text figs. [25 refs.]

A more detailed account of the methods used by the authors [see this *Bulletin*, Vol. 29, p. 577]. The virulence of the virus in numerous passages in two serial cultivation experiments remained constant, from which it is evident that the methods which have been used for the cultivation of other viruses have also been successful in the case of yellow fever. A photograph is reproduced showing ganglion cells containing acidophile masses in the nuclei. *E. H.*

MARTIN-CHARPENEL (G.), MATHIS (Maurice) & KOLOCHINE (C.). Vérification d'une souche de virus amaril adaptée à la souris blanche. [**Verification of a Mouse Strain of Y. F.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 533–535.

A strain of yellow fever after eight passages in mice was still virulent for *Macacus rhesus*, in which it produced a typical and fatal infection. Mice inoculated intracerebrally with virus from this monkey died after fairly uniform intervals, whilst the original strain before having been passaged in mice, required three passages in these animals before it became adapted and gave uniform results. *E H.*

Frobisher (Martin), Jr Sobre a gordura nos figados de macacos mortos de febre amarella [**The Liver Fat of Monkeys Dead of Y. F.**]—*Brasil-Medico* 1932 Oct 8 Vol 46 No 41. pp. 861–863

States that the fat in the liver of a macaque dead of yellow fever differs from that of chloroform poisoning in the amount of iodine it will absorb In other respects the results of analyses are similar in the two conditions, the findings are given in a table *H H S*

Cazanove (F) & Robert (Léopold) Empoisonnement par le phosphore et fièvre jaune [**Phosphorus Poisoning and Y. F.**]—*Bull Soc Path Exot* 1932 July 6 Vol 25 No 7 pp 853–858

A comparison of a case of phosphorus poisoning at Dakar with the analogous features noticed by early writers *E H*

Monteiro (J Lemos) Estudos sobre a febre amarella Modernos conhecimentos sobre a infecção experimental [**Studies on Y. F. Modern Knowledge of the Experimental Infection.**]—*Mem Inst de Butantan* 1930 Vol 5 pp 53–170 With 44 graphs & 10 figs on 5 plates [222 refs English summary

A good general account of the subject with special reference to work done at the Butantan Institute *E H.*

Dinger (J E) De beteekenis van het gele koortsvraagstuk voor Nederlandsch-Indië—*Geneesk Tijdschr v Nederl Indië* 1932 Sept 27 Vol 72 No 20 pp 1331–1336

Sawyer (Wilbur A) Historia de la fiebre amarilla desde la epidemia de nueva Orleans en 1905—*Bol Oficina Sanitaria Panamericana* 1932 July Vol 11 No 7 pp 689–699 40 refs

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RELAPSING FEVER AND OTHER SPIROCHAETOSES.

NICOLLE (Charles), ANDERSON (Charles) & LAIGRET (Jean). Etude des trois premiers cas de fièvre récurrente hispano-africaine observés en Tunisie et, plus spécialement, de leurs virus. [**Three First Cases of Spanish-African R. F. observed in Tunis, with Special Reference to the Virus.**]—*Arch. Inst. Pasteur de Tunis.* 1932. July. Vol. 21. No. 1. pp. 43–72. With 1 chart.

The authors have obtained spirochaetes belonging to the group *S. hispanica* de Buen, from three human cases of relapsing fever observed in Tunis. The transmitting agent in these cases was doubtless *Ornithodorus erraticus*, but specimens of this tick found at Carthage were infected with another strain, *S. erratici*, which seems to be more closely related to *S. normandi*, occurring in the wild rodents.

The spirochaetes of the third case of relapsing fever were transmitted experimentally by *O. erraticus*, *O. savignyi* and *O. turicata*, the latter from Mexico. In each species of tick the infection by bite was from one stage to the next. In one out of two experiments on the third case the spirochaetes persisted for six days in the louse, whilst as a general rule these organisms disappear from the gut within a day. Finally, the authors point out that the spirochaetes of the *hispanica* group are an excellent example in support of their view that these are not distinct species of relapsing fever spirochaetes, but only individuals that can be grouped together according to their pathogenicity and their method of transmission. *E. Hindle.*

DE LA CAMARA (Pedro), FERNANDEZ MARTINEZ (Jose), DE BUEN (Eliseo) & JUAREZ (Ernesto). Estudios sobre quimioterapia de la fiebre recurrente española. [**Chemotherapy of Spanish R. F.**]—*Medicina Países Cálidos.* Madrid. 1932. May. Vol. 5. No. 3. pp. 218–226. [14 refs.] French summaries.

The authors treated cases of Spanish relapsing fever with various arsenical preparations and from the results here recorded it would appear that the organism possesses a considerable degree of resistance to arsenicals, and to some more than others. Neosalvarsan and novarsenobillon were the most serviceable, but the number of patients treated by these was so small that no valid deductions can be drawn. Nine were given spirocid Bayer in doses up to 1 gm.; one had no fever after the third dose, but had 11 doses in all; in the other eight there was no result. Stovarsol and quiniostovarsol, though tried in several cases, were ineffectual; the fever continued even after prolonged courses of treatment with doses of 0·2 to 0·5 gm. *H. H. S.*

FELDT (Adolf). Ueber Arzneifestigung von Spirochäten im Tierversuch. [**Arsenic Resistance of Spirochaetes in Animal Experiments.**]—*Klin. Woch.* 1932. Aug. 13. Vol. 11. No. 33. pp. 1378–1380. [19 refs.]

The author has studied arsenic resistance in spirochaetes using strains of *S. recurrentis* in mice and *S. pallida* in rabbits. In mice strains of *S. recurrentis* were produced which were resistant against salvarsan and solganal respectively. It was found that the spirochaetes were especially sensitive to these drugs during some of the earlier passages after treatment. Thus a strain which at the beginning of the experiment was treated by intravenous injections of 1/1000 gm.

per cc. per 20 gm. mouse, in the next passage was resistant against 1/800, and in the 3rd against 1/500. Then it suddenly became more susceptible to the drug than the original normal strain and the 4th passage spirochaetes were killed by doses of 1/1000. At the 20th passage it was resistant against 1/200 and after a total of 40 passages reached its maximum resistance, against a dose of 1/100. Similar results were obtained in preparing strains resistant against solganal. This salvarsan-resistant strain, after passaging in normal mice for ten weeks lost its resistance, but the similar solganal-strain was still resistant after nineteen months. A strain of *S. pallida* after ten passages in rabbits during 14 months, was still resistant against double the minimum curative dose of salvarsan. *E. H.*

HASSKÓ (Alexander). **The Effect of Spirochete and Trypanosome Infection on the Distribution of Chemotherapeutical Drugs.**—*Jl. Comp. Path. & Therap.* 1932. Sept. Vol. 45. Pt. 3. pp. 230–239. With 4 figs.

An account of experiments with mice infected with *S. recurrentis* and subsequently treated with various substances. The results seem to show that the infection influences the function of the Kupffer cells of the liver and the perifollicular cells of the spleen, and hinders their phagocytic capacity at the culmination of the infection. The infection altered the deposition of drugs which are usually deposited in the reticulo-endothelial cells, and also the distribution of drugs such as neosalvarsan having affinities for the connective tissue Infected mice injected intravenously with silver-salvarsan at the height of infection showed difficulty in breathing and did not move spontaneously whilst normal mice receiving similar doses showed no ill effects. The mice were killed 30 minutes after the injections and examined histologically, when a marked difference could be seen between the deposition of the drug in the normal and infected mice. In both the tissues of the lungs were uniformly impregnated with arsenobenzol granules, but in the Kupffer cells of the infected liver phagocyted granules were seen only in some places and were irregularly distributed, and they were absent from the phagocytic cells of the spleen and irregularly deposited through this organ. In the normal animal, on the contrary, the granules were evenly distributed in the Kupffer cells of the liver and in the phagocytic cells of the spleen. Infection with *Trypanosoma equiperdum,* which does not influence the function of the mesenchymal system, did not essentially alter the distribution of colloidal gold or salvarsan; therefore the effect of relapsing fever cannot be explained as being the result of saturation with phagocytosed parasites. The paralysing effect of relapsing fever on the reticulo-endothelial cells is only transitory and deposition may be observed two hours after the injection, although absent after half an hour. It is suggested that the delay may be explained by assuming that the drugs are first absorbed by the spirochaetes and become deposited only later together with them. *E. H.*

KLEINE (F. K.) & KRAUSE (Magdalene). Zur Uebertragung der Rückfallfieberspirochäten durch Zecken. [**Transmission of R. F. Spirochaetes by Ticks.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 587–589.

The authors have fed uninfected *Ornithodorus moubata* received from Tanganyika on mice heavily infected with *S. duttoni,* and subsequently on normal mice. After a varying number of feedings on mice, the ticks were finally killed and examined, some microscopically and others experimentally. It was found that the spirochaetes died out in some of the ticks [confirming previous observations on this subject by SCHUBERG and MANTEUFEL, and the reviewer] ; in other instances the ticks might feed a number of times without producing any infection and yet later become infective ; also ticks might produce infections and then fail to infect, and subsequently again become infective.

In opposition to the results of NICOLLE and his co-workers, adult ticks could be infected and become infective. The authors found no evidence in support of the view that spirochaetes as such are absent from infected ticks and were able to find the organisms not only in various organs of the body, but also in eggs laid by infected females.

E. H.

ADANT (M.). Au sujet d'un spirochète isolé chez un rat du Katanga et pathogène pour l'homme. [**A Spirochaete Isolated from a Katanga Rat and Pathogenic for Man.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 259–264.

The author has examined 51 examples of various species of wild rodents for relapsing fever spirochaetes by inoculation of blood and, in some instances, of the brain, into susceptible animals. The species examined included *Taterona liodon, Aethomys kaiseri* and *Mastomys coucha* (?), and were caught in various regions of Katanga Province. All these species are susceptible to experimental relapsing fever, and some of them were caught in localities where infected Ornithodorus occurred. Only one individual, an *Aethomys kaiseri* caught at Mukebo, was found to be naturally infected, the inoculation of its brain into another wild rat resulting in the appearance of spirochaetes in the blood of the latter after an incubation period of eleven days. This organism morphologically resembled the human relapsing fever spirochaete and when inoculated into two human subjects produced a single attack of fever with parasites in the blood. It also produced infections when inoculated into two species of monkeys and various wild rats, but the guineapig was refractory. *E. H.*

HIROKI (H.). Experimentelle Untersuchung ueber die Persistenz der Recurrensspirochaeten im Gehirn. I. Mitteilung : Ueber die grundlegenden Untersuchung mit dem mandschurischen Recurrensspirochaeten. [**Experimental Study of Persistence of R. F. Spirochaetes in the Brain. Part I. Experiments with Manchurian R. F.**]—*Jl. Oriental Med.* 1932. Aug. Vol. 17. No. 2. [In Japanese. German summary pp. 11–12.]

——. II. Mitteilung: Der Einfluss des künstlichen Verfahrens auf die Persistenz der Recurrensspirochaeten im Gehirn. [**Part II. Influence of Artificial Treatment on Persistence of R. F. Spirochaetes in the Brain.**]—*Ibid.* Sept. Vol. 17. No. 3. [In Japanese. German summary pp. 21–24.]

Using a strain of Manchurian relapsing fever maintained in rats and mice in the laboratory for ten years, the author infected 42 mice and examined the blood and brain for spirochaetes at various intervals. Both remained infective up to the 32nd day, after which the mice were completely negative with the exception of a single individual that showed a residual brain infection 60 days after being inoculated, the blood being negative. In view of these results it is evident that persistent brain infections are very rare with this strain of relapsing fever and cannot be considered as an essential feature of the infection.

The author altered the virulence of the same strain of Manchurian relapsing fever in various ways in order to test PRIGGE and ROTHERMUNDT'S theory that residual brain infections are the result of low virulence and a feeble development of antibodies. The original strain had a mortality of 63 per cent. in mice ; after ten passages in mice using the percutaneous method of infection the mortality was 46 per cent. ; infecting *per os*, the mortality in mice was reduced to 49·2 per cent. after eleven passages, and to 21·1 per cent. after twenty-three passages ; and after five passages in man the mortality was 53 per cent. The original strain and the percutaneous one were compared for susceptibility to neosalvarsan but showed no difference. Mice were injected with three of the modified strains as well as the original one and subsequently examined for residual brain infections but all were negative. The immune serum of mice that had recovered from the strain of lowest virulence, protected mice not only against this strain, but also against the original one of much higher virulence. The author's results therefore give no support to PRIGGE and ROTHERMUNDT'S theories, but are in favour of the view that those strains of spirochaetes persisting in the brain do so as the result of a specific neurotropic character. *E. H.*

ROTHERMUNDT (M.). Untersuchungen ueber die Gehirnpersistenz der Rekurrensspirochäten bei weissen Mäusen und ihre Bedeutung bei der Beurteilung chemotherapeutischer Versuche. [**Persistence of R. F. Spirochaetes in Brains of White Mice ; its Significance in Chemotherapeutic Experiments.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 76. No. 3/4. pp. 201–213.

The author studied persistent brain infections in mice infected with various strains of *S. duttoni*, *S. crocidurae*, and *S. hispanica*, respectively. Tables are given showing the results of the examination of blood and brains in mice infected with a strain of *S. duttoni* in 1926, compared with a similar test of the same strain four years later. In 1926 all the mice showed residual brain infections, compared with only 30 per cent. in mice infected in 1930. The strain was then used for infecting a human patient, and afterwards inoculated into white mice, and in these the number showing residual brain infections rose from 30 to 55 per cent.

A strain of *S. crocidurae* gave 100 per cent. residual brain infections in 1928, but only 22 per cent. in 1931 ; and a strain of *S. hispanica* fell from 58 per cent. in 1928 to about 20 per cent. in 1931.

In view of these results the author urges that the examination of the brain for spirochaetes, as a criterion of the efficacy of any chemotherapeutic substance, and also the use of persistent brain infections for general chemotherapeutic experiments are of little value. The use of such strains only comes into question when it is desired to test whether or not any substance kills the spirochaetes in the brain. *E. H.*

MATHIS (C.) & DURIEUX (C.). Identité, à Dakar, de *Spirochaeta duttoni* var. *crocidurae* et du spirochète infectant dans la nature *Ornithodorus erraticus.* **[Identity of** *S. duttoni* **var.** *crocidurae* **with the Spirochaete found in** *O. erraticus* **at Dakar.]**—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 843–853.

A detailed account of the cross immunity experiments showing the identity of strains of relapsing fever isolated respectively from *Ornithodorus erraticus*, caught wild at Dakar, from a human case of the disease (Boufflers) and from infected shrew-mice (*Crocidurus*) [see this *Bulletin*, Vol. 29, p. 555.] *E. H.*

CANNAVÒ (L.). Ulteriore contributo allo studio della broncospirochetosi. **[Bronchial Spirochaetosis.]**—*Policlinico.* Sez. Prat. 1932. Mar. 7. Vol 39. No. 10. pp. 363–368. With 4 text figs. [12 refs].

Except as a record of 5 more cases of bronchial spirochaetosis this article adds little to present-day knowledge of this condition, but it is a good summary of the views held, especially in Italy, regarding it. Four of the author's cases were chronic and one subacute, but all rapidly improved—cough was allayed, blood, if present, disappeared, spirochaetes diminished or disappeared—after a course of arsenobenzol intravenously. The characteristics are the chronicity with alternating amelioration and aggravation of symptoms, the want of correlation between symptoms and physical signs, and the slight constitutional disturbance.

The author concludes that bronchospirochaetosis may be endemic in Sicily and Southern Italy since many among those whom he has attended have never left the country, and that it is probably infective (though not highly) as he observed 3 cases in one family. [As usual no evidence, beyond mere association, is adduced that these spirochaetes are pathogens at all.] *H. H. S.*

LORANDO (N. J). Etude critique sur l'épidémie de l'île de Syra. Dengue et spirochétose.—*Bull. Soc. Path Exot.* 1932. June 8. Vol. 25. No. 6. pp. 552–558. [12 refs.]

REMLINGER, CABANIE & BAILLY. Un caso de fiebre recurrente de espiroquetes virulentos para la cobaya en la zona española de Marruecos —*Rev Sanidad e Hig. Pública.* 1932. May. Vol. 7. No. 5. pp. 393–395.

SORIANO (Francisco). Aportaciones al estudio de la fiebre recurrente española.—*Medicina Países Cálidos.* Madrid. 1932. July. Vol. 5. No. 4. pp. 303–309.

LEPTOSPIROSIS.

COPANARIS (Ph.). Quelques données nouvelles sur les infections à spirochètes du groupe ictérogène en Grèce. [**Spirochaetal Jaundice in Greece.**]—*Bull. Office Internat. d'Hyg. Publique.* 1932. Sept. Vol. 24. No. 9. pp. 1427–1430.

An account of an outbreak of 29 cases of spirochaetal jaundice in the Isle of Cephalonia. The symptoms suggested mild Weil's disease, but although the majority of the patients showed a subicteric colour from the fifth day, none had any haemorrhagic symptoms. Guineapigs were infected by intraperitoneal injections of the sediment of centrifuged urine.

The sera of nine of these patients were examined by SCHÜFFNER in Amsterdam and serologically were found to be distinct from Weil's disease, whilst the sera of three cases from the Isle of Syra were identical with them. It is evident that these outbreaks of spirochaetal jaundice are caused by more than one type of organism. *E. Hindle*

PETZETAKIS (M.). A propos d'une épidémie de spirochétose ictérohémorragique à l'île de Syra. Origine hydrique de l'épidémie. Présence des spirochètes chez les rats d'égout, en Grèce. [**Epidemic of Spirochaetal Jaundice in the Island of Syra.**]—*Bull. Soc. Path. Exot.* 1932. May 11. Vol. 25. No. 5. pp. 411–416.

Further details on an epidemic of this disease in Syra [see this *Bulletin*, Vol. 29, p. 566]. A total of 31 cases with 3 deaths was observed, three-quarters of them occurring between 14th and 18th August, 1931. All the cases were traced to a particular café, which communicated with a filthy cellar, and the author considers that the water at this café may have been contaminated by infected rats. The nature of the spirochaete isolated was identified by the use of immune serum supplied by PETTIT.

The author also records the presence of *S. icterohaemorrhagiae* in the sewer rats of Syra and Athens. In Athens, 3 out of 96 rats showed spirochaetes in the kidney, and from one of these the infection was reproduced in the guineapig. *E. H.*

KIRSCHNER (L.). Waterspirochaeten en de ziekte van Weil. [**Water Spirochaetes and Weil's Disease.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. May 24. Vol. 72. No. 11. pp. 658–669. English summary.

Working in Bandoeng, the author attempted without success, to repeat the experiments made by BAERMANN and ZUELZER in Sumatra [see this *Bulletin*, Vol. 25, p. 602]. Using the same strain of water leptospira and the same breed of guineapig, it was found impossible to produce any signs of infection or persistence of the organisms in the blood. The Bandoeng house rat (*Rattus rattus diardi*) was found to be infected with *S. icterohaemorrhagiae*, four strains being isolated, all pathogenic for guineapigs. Spirochaetes were also cultured from three hot springs (38–42°C.) which had been used for years as a bathing establishment, but no cases of Weil's disease have yet been recorded in this region. *E. H.*

THIRY (U.) & VAN MEIRHAEGHE (A.). Recherches complémentaires sur les Leptospires aquicoles et les Leptospires ictéro-hémorragiques. [**The Water Leptospira and** *L. icterohaemorrhagiae.*]—*Rev. Belge Sci. Méd.* 1932. June–July. Vol. 4. No. 6. pp. 441–451. [Refs. in footnotes.]

The presence of coli-bacilli was not found to favour the development of these organisms in culture, and in many instances rendered the medium quite unfavourable to growth. Various strains of leptospira were grown in Verwoort's medium at varying degrees of pH ; the pathogenic rat and human strains grew best at 7·4 to 8·6, in one instance up to 9·8, whilst the water strains grew at 5·8 to 7·4 or 7·8. A mouse strain grew at 7 to 7·8. *E. H.*

KUNSTEIN (Erich). Ueber Verbreitung der Spirochäten vom Weiltyp in Freiburg i. Br. und Umgebung. [**Distribution of Weil-Type Spirochaetes in Freiburg i. Br. and its Environs.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 75. No. 1/2. pp. 173–190. [30 refs.]

The water leptospira was found in 60 per cent. of the waters examined including the drinking water of Freiburg, Ihringen and Lorrach. The pH of the infected waters varied between 6·9 and 7·5. Of 19 rats (*Mus decumanus*) from Freiburg i. Br., eight contained virulent *S. icterohaemorrhagiae* in their kidneys. *E. H.*

DINGER (J. E.). Het beloop der leptospirosis bij de Indische cavia. [**The Course of Leptospirosis in Guineapigs in Java.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Oct. 11. Vol. 72. No. 21. pp. 1440–1448. With 3 figs. on 1 plate.

After experimental inoculation with leptospirae guineapigs in Java usually (in 2/3 of 69 cases) die within 5 days, as compared with 7–8 days in Europe. If material with diminished virulence is used a large percentage (2/3) of the animals tested continue to excrete virulent leptospirae in the urine for a considerable period.

In one case by means of such a carrier the author succeeded in producing a contact infection in the stable. This urges him to warn other workers to take heed against this possibility, which might introduce errors in experiments aiming to show alteration of water leptospirae into virulent organisms. *W. J. Bais.*

SARDJITO. Verdwijning van de virulentie gepaard gaande met verandering van antigene eigenschappen van een ratten leptospira stam door te kweeken in water. [**Disappearance of Virulence together with Alteration of Antigenic Properties of a Rat Leptospira Strain by Cultivation in Water.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Sept. 27. Vol. 72. No. 20. pp. 1364–1372. With 1 plate.

In view of the still unsettled question whether saprophytic water leptospirae may acquire pathogenic properties, the author studied this question by cultivating a rat leptospira strain in water. For the technical details of the methods by which a pure culture was obtained the original paper should be consulted. After five months the strain had lost the antigenic properties of the original one. At the same time it had lost its pathogenicity for guineapigs which remained unaltered in the control, cultivated in ordinary serum dilution media. The morphological characteristics of the strain were slightly different from those of the original one ; it grew more luxuriantly and was more resistant to the oligodynamic influence of metals. It has in this way acquired the characteristics of a water leptospira. The author is inclined to believe that this alteration may be reversible. *W. J. Bais.*

AULIA & COHEN (A. J.) with SARDJITO (M.) & MOCHTAR (A.). Een nieuwe spirillosis ? **[A New Spirillosis ?]**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Sept. 27. Vol. 72. No. 20. pp. 1359–1363. With 4 figs. on 1 plate & 1 chart.

From the blood of a native suffering from a chronic intermittent and remittent fever, characterized by a relatively quick pulse, anaemia and haemorrhagic pericarditis, the authors cultivated a new spirillum for which they propose the name of *Spirillum cardiopyrogenes.* This spirillum is slightly pathogenic for guineapigs, but these animals can easily be infected by inoculation. The patient's serum contained antibodies against the strain. The organism is differentiated from "*Spirochaeta gallica*" (stated to have been found in trench fever) and from *S. morsus muris.* For details the original paper must be consulted. *W. J. Bais.*

KORTHOF (G.). Experimentelles Schlammfieber beim Menschen. **[Experimental Slime-Fever in Man.]**—*Zent. f. Bakt.* I. Abt. Orig. 1932. Sept. 21. Vol. 125. No. 7/8. pp. 429–434. With 1 fig.

Eleven patients were inoculated with cultures of leptospira from a strain of slime fever described by DINGER and VERSCHAFFELT [see this *Bulletin*, Vol. 28, p. 314]. Two were resistant but the other nine became infected after an incubation period of 5 to 9 days. The organisms were observed by dark ground examination of blood that had been triple centrifuged ; and were recovered by culture of the blood in six out of seven patients and also by the inoculation of blood into mice and guineapigs. Serological tests showed that the infection was distinct from Weil's disease. It is considered possible that some of the cases described by BAERMANN and ZUELZER [see this *Bulletin*, Vol. 25, p. 602] may have been slime fever rather than Weil's disease. *E. H.*

CAMINOPETROS (Jean). Sensibilité du spermophile *Citillus citillus* à la spirochétose ictérohémorragique. **[The Susceptibility of the Spermophile to** *S. icterohaemorrhagiae.*]—*C. R. Acad. Sci.* 1932. May 30. Vol. 194. No. 22. pp. 1991–1992.

The author finds that this animal is even more susceptible than the guineapig to infection with *S. icterohaemorrhagiae.* Whatever the method of infection, or source of the spirochaete, the spermophiles invariably succumb to the disease, usually within 6 to 8 days, and the spirochaetes can be seen in the blood within 48 hours after inoculation. Jaundice is very distinct in the muscles and rib cartilages, less evident in the skin and mucosa. The lungs show haemorrhages, the intestine is very congested, both spleen and liver are greatly enlarged. The infection is readily maintained in these animals by passage in series, and since the spirochaetes multiply in all the organs of the body, the spermophile would seem to be a more convenient host than the guineapig. *E. H.*

PETZETAKIS (M.), MELANIDIS (C.) & TZORTZAKIS. Sur la sensibilité du mouton, du chevreau et du porcelet au virus de la spirochétose ictérohémorragique par voie intratesticulaire. [**Susceptibility of Sheep, Kid and Young Pig to Intratesticular Inoculations of** *S. icterohaemorrhagiae.*]—*C. R. Soc. Biol.* 1932. June 17. Vol. 110. No. 21. pp. 482–484.

A lamb, a kid and a young pig were each inoculated intratesticularly with a suspension of the organs of a guineapig infected with *S. icterohaemorrhagiae.* Certain reactions were observed and spirochaetes were recovered from the blood of the lamb and the kid, up to seven days after inoculation in the case of the latter. The pig seemed to be more resistant. *E. H.*

TROISIER (Jean). La spirochétose méningée expérimentale. [**Experimental Meningeal Spirochaetosis.**]—*Ann. Inst. Pasteur.* 1932. Sept. Vol. 49. No. 3. pp. 343–357. With 5 figs.

The subdural inoculation of a culture of *S. icterohaemorrhagiae* produced an acute or fatal meningitis in guineapigs and young rabbits, with or without jaundice. Young dogs showed two types of meningitis, one benign and curable, the other malign producing cachectic symptoms. In both types there was hypercytosis of the cerebrospinal fluid and an increase in the albumin content. Various monkeys were inoculated in the cerebrospinal canal and after a short incubation period showed fever and wasting, without jaundice, recalling human cases of the disease with meningeal symptoms. *E. H.*

LISSNER (Lothar). Ein Fall Weil'scher Krankheit auf den Philippinen. [**A Case of Weil's Disease in the Philippines.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 590–593 With 1 fig.

An account of a fatal case of jaundice clinically diagnosed as Weil's disease, although spirochaetes were not found. *E. H.*

CAMINOPETROS (J.). L'évolution du spirochète ictérohémorragique dans l'organisme du rat.—*C. R. Soc. Biol.* 1932. July 19. Vol. 110. No. 25. pp. 905–906.

LAIGNEL-LAVASTINE, BOQUIEN (Y.) & STERNE (J.). Spirochétose ictéro-hémorragique compliquée de phlébite au décours de la maladie.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. June 27. 48th Year. 3rd Ser. No. 22. pp. 1017–1020.

RAT-BITE FEVER.

RUYS (A Charlotte) Het gedrag van *Spirillum minus* in de muis in verband met de diagnose der rattebeetziekte. [*Spirillum minus* **in the Mouse in Relation to the Diagnosis of Rat-Bite Fever.**]—*Nederl Tijdschr v Geneesk* 1932 July 9. Vol 76 No 28. pp 3385–3388 With 1 fig German summary

In many cases the diagnosis of rat bite fever can be fully established from the history, the infiltration at the seat of the bite, the typical temperature curve, the rash and the result of administration of salvarsan This diagnosis can be confirmed by dark-field examination for spirilla in the exudate obtained from the seat of bite or in the serous fluid obtained from a papule and, if this is not possible, by examination of Giemsa-stained smears It is seldom possible to demonstrate spirilla in a thick blood film If a number of relapses have occurred, probably the best examination to make is one for the presence of lytic antibodies This reaction may be negative to begin with, but be positive with a relapse two months later There still remains the animal test and here the guineapig is not very suitable as it is not a highly susceptible animal The most susceptible of all test animals is the mouse Unfortunately the mouse is itself liable to a spontaneous infection and the author goes in some detail into the characters which distinguish *Spirillum minus* var *muris* from *Spirillum minus* var *morsus muris* Many observers consider them one and the same organism But if the blood, and in addition the peritoneal fluid, of the mouse prove negative on a preliminary examination, then this animal may be considered suitable for a testing diagnostic inoculation The inoculation of 0 2 cc of the blood of the patient or of the inflammatory exudate from around the bite or from a papule of the exanthem will suffice The first spirilla may be expected in the blood and peritoneal fluid of the mouse about a week later, and to reach large numbers and their maximum in 14 days, after which they disappear *W F Harvey*

FRÓES (Heitor P) Sodoku (Rat Bite Disease) and its Incidence in Brazil Brief Report of a New Case —*Jl Trop Med & Hyg* 1932 June 15 Vol 35 No 12 pp 185–186

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

CRAIG (Charles F.). **The Amebiasis Problem.**—*Jl. Amer. Med. Assoc.* 1932. May 7. Vol. 98. No. 19. pp. 1615–1620. [25 refs.]

The author concludes his survey by stressing the importance of treatment of infections with *E. histolytica* even though there may be no symptoms present that have attracted the attention of the infected individual. No one can tell what pathologic lesions may be present in such individuals or what lesions may develop in the future. Everyone harbouring this parasite should be treated as soon as the diagnosis is made. Treatment is for the best interests not only of the patient but also of the public, as the cure of every infection reduces by that much the danger of transmission of the parasite to others. *H. M. Hanschell.*

CRAIG (Charles F.). **The Pathology of Amebiasis in Carriers.**—*Amer. Jl. Trop. Med.* 1932. July. Vol. 12. No. 4. pp. 285–299. [31 refs.]

The author marshals evidence in support of his dictum that there is no such person as a healthy carrier of *Endamoeba histolytica*, if by that term is meant one in whom no lesions caused by the parasite are ever produced. If by the term " carrier " is meant an individual in whom the organism is living as a commensal without the production of lesions or symptoms due to its presence, it is very doubtful if the term should be used at all with reference to infection with this parasite. In every " carrier " cytolysis and necrosis of superficial epithelium continually occurs in microscopic areas of the intestine, followed fortunately in the majority of cases by rapid regeneration of epithelium and healing but in some definite ulceration occurs involving mucosa, submucosa, or muscular coats of intestine. *H. M. H.*

HIYEDA (Kentaro) & SUZUKI (Michisaburo). **Pathological Studies of Human Amoebic Ulcers, especially those of Carriers.**—*Amer. Jl. Hyg.* 1932. May. Vol. 15. No. 3. pp. 809–823. With 6 figs. [10 refs.]

The authors describe and illustrate well the morbid histology of five human cases in which amoebic ulcers were found in the large intestine : two of these cases they consider to have been " carriers." The course of an amoebic infection appeared to be as follows. When the amoebae enter the large intestine, the epithelium produces a large amount of mucus which prevents many of the amoebae from entering the tissues. The struggle between amoebae and mucus may go on for 2 to 8 days (this the authors have experimentally verified). If the amoebae succeed in making contact with the gut epithelium they cause, by production of a toxin, necrosis or necrobiosis of the superficial epithelial layer. The amoebae, though actually in lumen of gut, multiply when they come in direct contact with the gut tissue. Eventually a roughness or erosion of the superficial layer of the gut mucous membrane occurs. The amoebae penetrate deeper into the intestinal wall, multiply there, and produce a large area of necrosis and a typical crater ulcer is formed. If bacterial infection be severe, an abscess develops, and in bursting forms a crater ulcer also, but this is unusual. The amoebae within the tissue of the submucosa travel mostly in direction longitudinal to the gut axis; the ulcers are therefore wider below the surface; and there are formed funnel-like communications under the intact epithelial covering. If regenerating activities of epithelium and other tissue overcome the invading power of amoebae, reparation of the ulcer occurs causing thickening of submucosa. Restitutio ad integrum is never reached as long as amoebae are present. If small ulcers (such as the authors describe in the two "carrier" cases) occur with only a few amoebae, the balance of amoebic vitality and tissue resistance is well kept, and no marked intestinal symptoms occur. This is the state of the amoeba carrier. Cellular infiltration in amoebic ulcers mainly depends upon mixed infection of bacterial origin. None of the leucocytes has a special affinity for the amoebae or their products. *H. M. H.*

HEGNER (Robert). **Studies on Amoebiasis in Panama.**—*Jl. Parasitology.* 1932. Mar. Vol. 18. No. 3. pp. 153–158. With 13 figs. on 2 plates.

An interesting and valuable contribution, well illustrated. The author's experimental studies have shown that there is a mechanical penetration of the gut mucosa by the amoebae in monkeys experimentally infected; that immature cysts develop in faeces outside the body of the host; that excystation occurs in the small intestine of monkeys within about 3 hours after being inoculated into the stomach; that a single organism emerges from the cyst; and that cysts with one or two nuclei excyst as well as those with four nuclei. He finds no ground for the view that amoebae in gut lumen originate in the tissues; on the contrary they arise by multiplication in the lumen. The origin of amoebic ulcers is not yet clear. Bacteria probably play a role and follicular ulcers of bacterial origin may be involved, but amoebae appear unquestionably to be the active agents in formation and growth of these ulcers. *H. M. H.*

MELENEY (Henry E.), BISHOP (E. L.) & LEATHERS (W. S.). **Investigations of *Endamoeba histolytica* and Other Intestinal Protozoa in Tennessee: III. A State-Wide Survey of the Intestinal Protozoa of Man.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 523–539. With 7 maps & 2 graphs. [12 refs.]

20,237 persons in the rural portions of 69 counties of Tennessee were examined for intestinal protozoa. Four contiguous counties on the eastern Highland Rim had the highest incidence of *E. histolytica* in the State, with an average incidence of 22·8 per cent on one examination. The age incidence for each protozoon followed the curve usually described for it. The amoebae increased rapidly in incidence during childhood, showed a further slight increase in middle adult life and decreased after the age of sixty. *Giardia* reached its peak of incidence in early childhood and fell to a low level in adults. *Chilomastix* showed a peak in early childhood, decreased in the adolescent period and rose again in adults. Incidence of amoebae in whites and negroes showed no significant differences. *Chilomastix* and *Giardia* were found somewhat more prevalent in whites than in negroes. Habits of the people as influenced by physiographic environment probably influence the incidence of *E. histolytica* in the rural population groups studied. *H. M. H.*

i. IZAR (Guido). Amebiasi infantile. [**Amoebiasis in Infants.**]—*Riforma Med.* 1932. Sept. 17. Vol. 48. No. 38. pp. 1435–1436.
ii. MANSON-BAHR (Philip). **Amoebic Dysentery in Infancy.** [Correspondence.]—*Lancet.* 1932. Dec. 10. p. 1304.

i. The author states that amoebic infection is more common in infants than is generally believed; even those at the breast and in the early days of life are not immune. He quotes TARRO [? in Messina; the reference is not given] as recording the ages of 30 children dying of amoebiasis, on whom post mortem examinations were carried out; they were 8, 16, 21, 23 days, 1–2 months (6 cases), 2–3 months (4), 3–4 months (4), 4–5 months (2), 5–6 months (1), 6–7, 7–8, and at 9 months (2 each) and between 1 and 2 years (3).

Clinically, some children present typical dysenteric symptoms, others suffer from algid, choleraic symptoms, or those of sepsis and toxaemia, or a dystrophic or "gastrodyspeptic" syndrome. In a majority of instances infection is said to be contracted from the custom of the mothers having their children sleeping with them in bed.

Treatment is difficult because children so young as these do not tolerate emetine well. Thus, the doses which he uses (and even these with great caution) are: Up to 1 year a total of 5 mgm. in 10 days; from 1–6 years 7·5 mgm., from 6–10 years 10 mgm. He prefers stovarsol of which he gives: Up to 1 year a daily dose of 3 mgm. for a fortnight; 1–6 years 6 mgm.; 6–10 years 10 mgm.

ii. Dr Manson-Bahr comments upon Dr. IZAR's findings and believes that the cases described by the latter were more probably infections of bacillary dysentery. He bases this conclusion on the ground that ulcers do not develop for a year, possibly longer, after oral infection with the Entamoeba. Dr. Manson-Bahr himself, in a long experience with this disease, has never met with a patient under the age of 5 years. He notes also that the large macrophages, abundant in the stools of bacillary dysentery, closely simulate, and are often mistaken for, *E. histolytica.* *H. H. S.*

ALEXEIEFF (A.). Sur la "triade intestinale" dans la dysenterie amibienne. [**The Intestinal Triad in Amoebic Dysentery.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Aug. Vol. 36. No. 8. pp. 440–444. With 2 text figs.

MANSON-BAHR in Fiji (1910) first noted the characteristic cellular exudate and its importance in differential diagnosis in bacillary and amoebic dysentery respectively. This exudate was further and more intensively studied in the near East during the Great War by the late Dr. John ANDERSON and many authors since have given attention to it and reported on its value in diagnosis among whom Dr. Alexeieff's observations deservedly rank high. In this paper (well illustrated) he pays tribute to ANDERSON's work and confirms his observations. It is often hard to find *E. histolytica* in the stools of early amoebic dysentery: the diagnosis is certain however if pseudopyknotic nuclei of polymorphonuclear leucocytes (ANDERSON's pyknotic) are present and is finally confirmed if eosinophils and Charcot-Leyden crystals be found as well. These latter however appear later in the illness. He cites clinical observations in support of the contention that the number of these polymorphs with pseudo-pyknotic nuclei depend directly on the depth to which infection has penetrated. They are most numerous in submucous invasions, least in superficial invasions. In the latter the intestinal juice dilutes the ferments of the amoeba.

With ANDERSON he believes that the amoebae secrete a proteolytic ferment which digests the cytoplasm but has less action on the nuclei of the polymorphonuclear leucocyte. ANDERSON reported 83 per cent. of pyknotic polymorphs in his cases. Dr. Alexeieff cites one of his cases—a severe one—with 85 per cent. He insists that the presence of pseudopyknotic nuclei is the first recognizable sign of infection of the gut by *E. histolytica.* *H. M. H.*

MACKIE (Thomas T.). **Iodoxyquinolin Sulphonic Acid (Anayodin) in the Treatment of Intestinal Amoebiasis.**—*Twentieth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1931. pp. 112–122. [16 refs.]

The drug was tried on seven acute and chronic cases of amoebic dysentery, and 23 chronic cyst passers. In both groups it eliminated promptly *E. histolytica* from the stools. Seventeen cases re-examined from 10 days to 2 months after treatment disclosed no evidence of amoebic infection. The drug appeared to be relatively ineffective against other intestinal protozoa. *H. M. H.*

GAIDE & NIEL. Note sur la recrudescence des abcès du foie au Tonkin et considérations sur le traitement émétinien de l'amibiase. [**Recrudescence of Liver Abscess in Tonking. Treatment by Emetine.**]—*Bull. Soc. Méd.-Chirurg. Indochine,* 1932. Apr. Vol. 10. No. 3. pp. 347–365. With 1 chart.

Between 1918 and 1932 102 cases of liver abscess occurred with 27 deaths. The author gives a critical survey of these cases and in conclusion urges the necessity of watching closely all patients suffering from hepatic congestion and amoebic dysentery, of energetic emetine treatment from the start, and of continuing after the first symptoms have disappeared, provided that more than 1 gram be not given in any one month, and of systematic exploratory puncture of liver.

H. M. H.

BIGGAM (A. G.). **A Consideration of Certain Points in the Treatment of Amoebic Abscess.**—*Jl. Roy. Army Med. Corps.* 1932. Aug. Vol. 59. No. 2. pp. 141–144. With 1 fig.

The author describes two cases of dysentery in whom sigmoidoscopy revealed characteristic ulceration of bowel, active *E. histolytica* being demonstrated in the stools. On admission to hospital neither patient had any sign or symptom of liver involvement, and both showed satisfactory improvement in bowel symptoms, Case 1 on yatren enema and oral stovarsol, and Case 2 on emetine bismuth iodine and yatren enema ; both however developed amoebic hepatic abscess. An experience (notes the author) compelling great caution in accepting claims for the curative value in amoebic abscess of liver, or in early amoebic hepatitis, of any drug other than emetine. *H. M. H.*

NORTIER (A.). Over de therapie van lever-amoebiasis. [**Treatment of Amoebiasis of the Liver.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Aug. 30. Vol. 72. No. 18. pp. 1184–1191. With 4 charts. [11 refs.]

The author pleads for intrahepatic emetine injections (in the abscess cavity) in cases of large abscess of the liver. Five illustrative case reports are quoted. The author's arguments are chiefly: (1) The danger of secondary infection in cases of surgical drainage; (2) the way in which the abscess contents act as a medium to carry the drug to all the corners of the cavity. As a rule 90 mgm. of emetine is injected daily into the abscess, and subcutaneous injections are given also. *W. J. Bais.*

KATAROPULO (A.). Amöbenperikarditis. [**Amoebic Pericarditis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 544–548. [12 refs.]

Describes and discusses, with references to other authors, a case of liver abscess with dysenteric symptoms, ten years after a severe dysentery. The liver pus revealed *E. histolytica.* 7 years later liver abscess recurred and ruptured into the pericardium setting up fibrinous pericarditis; death. In the liver abscess pus living *E. histolytica* were found, none in the pericardial contents and many in the pericardial walls. *H. M. H.*

PENSO (Giuseppe). L'"Entamoeba vesicalis" (Penso). [**Entamoeba vesicalis.**]—*Ann. di Med. Nav. e Colon.* 1932. July–Aug. 38th Year. Vol. 2. No. 1–2. pp. 413–414. With 4 figs. on 1 plate.

In an earlier paper reviewed in this *Bulletin* (Vol. 28, p. 263) the author gave the name *Entamoeba vesicalis* to certain structures which he had seen in urine and had regarded as amoebae. The reviewer came to the conclusion that the author was not dealing with amoebae but with degenerate cells. In the present paper the author returns to the subject and describes a further case in which he claims that the same amoeba was found. He also mentions three other workers who have stated recently that they had found this amoeba in human urine. The author in support of his contention that he is dealing with an amoeba gives four microphotographs illustrating four phases in the production of a pseudopodium by an amoeba. The pseudopodium is shown as a perfectly spherical structure which in the fourth illustration is attached to the amoeba by a narrow portion and has reached a size greater than the amoeba itself which, moreover, has shown no diminution in size or alteration as regards its shape or the position of its nucleus. The supposed pseudopodium is evidently of slow formation as four microphotographs were taken. What it is cannot be stated definitely. It may be a product of cell degeneration or of some change in the medium but it is certainly unlike any pseudopodium ever seen by the reviewer who finds nothing in the present paper to justify him in changing the opinion he originally expressed. As regards the other observers mentioned the author says that confirmation of his observations are beginning to appear. Two of these have recorded single cases while one states that he has found *E. vesicalis* in eleven cases of cystitis in Somaliland. It seems clear in view of the author's claims that these statements cannot be accepted without confirmation. *C. M. Wenyon.*

CROPPER (C. F. J.) & MITRA (Jagdish). **A Case with** *Entamoeba histolytica* **in the Urine.**—*Indian Med. Gaz.* 1932. July. Vol. 67. No. 7. pp. 387–388.

The authors identified this *Entamoeba histolytica* on the following reported data. On one occasion in one preparation of urine they saw "an amoeba [sic] exhibiting movements typical [sic] of *E. histolytica*; its diameter was about 20μ. It contained 4 red cells. No clear differentiation between ectoplasm and endoplasm could be made out." *H. M. H.*

Broc (René). Un cas d'amibiase pulmonaire pure chez un musulman tunisien. Congestion pulmonaire avec hémoptysie. Guérison rapide par l'émétine. [**Pulmonary Amoebiasis in a Tunisian.**]—*Tunisie Méd.* 1932. Jan. Vol. 26. No. 1. pp. 16–32. With 1 chart in text & 2 figs. on 1 plate. [22 refs.]

Pulmonary symptoms. Sputum examinations revealed nothing definite but precystic amoebae were found in the stools. All pulmonary symptoms rapidly disappeared after emetine injections. [So much and no more for the diagnosis " d'amibiase pulmonaire pure." !] *H. M. H.*

Koch (Dorothy A.) & **Reed** (Alfred C.). *Endamoeba histolytica.* **Unusual Strains.**—*Amer. Jl. Trop. Med.* 1932. July. Vol. 12. No. 4. pp. 307–316. With 10 figs. on 2 plates.

An interesting study, well illustrated, of the amoebae found in a case of dysentery, from which the authors conclude that they were here dealing, in one patient, with two atypical strains of *E. histolytica* : the first large, highly pathogenic and rapidly eradicated by carbarsone ; the second smaller, also somewhat atypical in the trophozoite form, but forming cysts, and therefore probably more resistant to treatment.

H. M. H.

Kiefer (Everett D.). **The Craig Complement-Fixation Test for Amebiasis in Chronic Ulcerative Colitis.**—*Amer. Jl. Med. Sci.* 1932. May. Vol. 183. No. 5. pp. 624–631. [12 refs.]

Case histories of 19 cases of chronic ulcerative colitis are briefly reported. The author points out and discusses the great difficulty in differentiation between chronic ulcerative colitis and chronic amoebic colitis. Of the 19 cases 15 gave a positive result with the Craig complement fixation test for *E. histolytica* infection. The author draws no conclusions as to the significance of this finding, but suggests that chronic ulcerative colitis may be a pyogenic infection of the colon superimposed upon an original amoebic ulceration. *H. M. H.*

i. **Heathman** (Lucy). **Studies of the Antigenic Properties of Some Free Living and Pathogenic Amebas.**—*Amer. Jl. Hyg.* 1932. July. Vol 16. No. 1. pp. 97–123. With 1 fig. [35 refs.]

ii. **Sherwood** (Noble P.) & **Heathman** (Lucy). **Further Studies on the Antigenic Properties of Pathogenic and Free Living Amebas. II. Complement Fixation in Amebic Dysentery.**—*Ibid.* pp. 124–136. [16 refs.]

i. The author's work leads her to conclude that this taxonomic study by means of the antigenic properties of amoebae corroborates Schaeffer's classification based on morphology, in the sense of being able to distinguish in a clear cut way between species as classified by Schaeffer.* It had not been possible always to place them in the same order by serological methods as by morphological ones. Both free living and pathogenic amoebae appeared to be good antigens as judged by formation of precipitin and complement-fixation antibodies. The precipitate was characteristically light but definite. It was possible in only a few cases to infect young kittens with supposedly pathogenic strains of *E. histolytica.* It was impossible to infect kittens with the free living *Flabellula citata*, although it possessed other properties similar to *E. histolytica* ; *e.g.*, it readily ingested and digested red blood cells from different animal species. Ingestion and digestion of red blood cells is not therefore a suitable criterion for pathogenicity of amoebae.

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* Taxonomy of Amebas, *Carnegie Inst. Washington Publ. 345.* 1926.

ii. The authors set out to repeat and investigate CRAIG's previous work. They found that using 3 new amoeba lipoid antigens and the Kolmer haemolytic technique positive complement fixation (C. F.) in amoebic dysentery occurred in nearly 100 per cent. of the cases (preparation of antigens and technique here described). Four out of the 111 individuals used for controls gave four plus C. F. with one (most sensitive) of the antigens, and negative results with the other two. Two of these four had been handling cultures of *E. histolytica* for several months but the other two gave no history of contact or infection and stool examinations of all four were negative. In both infected and apparently normal persons, C. F. when it occurs is due to presence of specific immune bodies, specific for an amoeba lipo-protein or lipoid (haptene), which is an expression of natural immunity or latent infection ; and not necessarily of tissue immunity. The occurrence of positive C. F. in some cases of chronic ulcerative colitis [see KIEFER, above p. 25] in which no amoebae were found needed further investigation. *H. M. H.*

MENENDEZ (Paris E.). **Serological Relationships of** *Entamoeba histolytica*.—*Amer. Jl. Hyg.* 1932. May. Vol. 15. No. 3. pp. 785–808. [22 refs.]

The medium described by TANABE and CHIBA [this *Bulletin*, Vol. 29, p. 124] was found to be best because of the relatively poor growth of bacteria associated with *E. histolytica* under cultivation ; partial anaerobiasis was of value in maintaining viability of stock *E. histolytica* cultures ; standardization of bacteria accompanying cultures of the amoeba facilitated control of non-specific serological reactions. Specific complement binding, precipitin and amoebolytic antibodies were demonstrable in the sera of rabbits immunized with *E. histolytica* and *E. barreti*. Negative benzoin-flocculation tests were obtained with *E. histolytica* immune sera. Rabbits immunized with *E. histolytica* and *E. barreti* were found to be specifically hypersensitive to the corresponding antigens three months after the last injection. Any strain of *E. histolytica* gave effective antigen for use in diagnosis of infections with that parasite.

The author concludes that results of his study not only indicate the practical application of immunological tests in diagnosis of amoebic infections but also their usefulness in classification of certain animal parasites. *H. M. H.*

BACILLARY DYSENTERY

MACKIE (Thomas T.). **Ulcerative Colitis due to Chronic Infection with Flexner-Y Bacillus. Report of Case with Cure by Autogenous Vaccine.**—*Jl. Amer. Med. Assoc.* 1932. May 14. Vol. 98. No. 20. pp. 1706–1710. [28 refs.]

A valuable study. The author notes that the Flexner-Y group of dysentery bacilli may cause sporadic cases of mild diarrhoea and dysentery. Occurrence of these cases does not require presence of epidemic conditions. A significant number of these individuals may become persistent carriers and develop ulcerative lesions of the lower part of the bowel, even though the initial acute attack may have been very mild. The lesions of chronic bacillary dysentery differ in no respect from those encountered in many of the cases of so-called ulcerative colitis. Intermittence of the excretion of the bacilli is one of the characteristics of chronic Flexner bacillus infection, and repeated cultures over a period of weeks may be necessary to demonstrate them. Taking cultures direct from the floor of the ulcer through the sigmoidoscope materially increases probability of recovering the organism. Autogenous vaccine in adequate dosage sufficiently prolonged is an efficient therapeutic procedure. *H. M H.*

BROWNE (Donovan C.). **Further Study on the Incidence of** *B. dysenteriae* **in the Normal Individual.**—*Proc. Soc. Experim. Biol. & Med.* 1932. June. Vol. 29. No. 9. pp. 1272–1273.

The author had previously reported finding in stools of 50 healthy individuals selected from New Orleans public clinics *Bact. dysenteriae* in 6 cases, one a true Shiga type and five the lactose fermenting strain described by DUVAL. He now reports results of a similar investigation of 50 healthy individuals selected from private practice and living under much better hygienic conditions. In 3 cases *Bact. dysenteriae* was found, one Duval, one Hiss Y and one Flexner. *H. M. H.*

WATS (R. C.) & JAFAR (M.). **Dysentery in Burma (Military Stations) with a Note on Some Post-Dysenteric Infections.**—*Indian Med. Gaz.* 1932. Aug. Vol. 67. No. 8. pp. 446-448 With 1 chart.

Total number of cases with mucus or blood and mucus in stools 269. *B. dysenteriae* isolated in 126. *E. histolytica* in 34. Bacillary exudate but no dysentery bacilli or pathogenic amoebae found 46. Indefinite exudate 106. Cases showing *Bact. dysenteriae*, Flexner 102; Shiga 11; Schmitz 8; Sonne 3; Morgan No. 1, 1, Carolinus 1.

H M H.

IGUCHI (Jokai) & OTSUBO (Goya). **Oral Vaccination for the Prevention of Dysentery and** *Ekiri.*—*Jl. Public Health Assoc. Japan.* 1932. May. Vol. 8. No. 5. pp. 4–9.

— —, OHOTSUBO (Itsuya), SUGINA (Tameji), KANNO (Jiro), NAGATSUKA (Takashima), OKUAKI (Giichi), KASHIWAGI (Seisho), OSHIMA (Kinko), EHUCHI (Churoku), HACHIYA (Tsunetaro), MISAKA (Osuke) & OHSUKA (Takeshi). **Prophylaxis of Dysentery by** *per os* **Immunization.**—*Kitasato Arch. Experim. Med.* 1932. July. Vol. 9. No. 3. pp. 218–223.

Observations during two consecutive years on 130,000 children, two to six years old, in the Tokyo district, who were made to take a dysentery bacillus vaccine per os, showed a reduction by half of the morbidity rate of dysentery and *Ekiri*, and some lowering of the death rate. The authors are arranging to make another experiment on some 470,000 children. Results to be reported in due time. *H. M. H.*

VAN DER WALLE (N.). Over het conserveeren van dysenterische ontlasting. [**On the Preservation of Dysenteric Stools.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Aug. 2. Vol. 72. No. 16. pp. 1053–1056.

The author's aim was to preserve dysenteric stools so as to make successful bacteriological examination possible after an interval of a few days. Two methods were applied :—

(1) Flakes of the mucus were washed in salt solution, put in a watch glass and exsiccated in the dark above calcium chloride.

(2) Mucus flakes were enclosed in paraffin of a low melting point (45°C.).

In both cases after the lapse of time desired the material is examined again, in the second case after melting the paraffin, shaking it with culture broth and keeping it in the incubator for a few hours. Endo- and bile-Endo-plates were used.

After keeping the specimen for 6–14 days at room temperature the author succeeded in cases which primarily had given positive results in obtaining such results again by the first method in 11 out of 14 cases, by the second in 13 out of 31 of Shiga-Kruse bacillus infection and in 4 out of 4 and in 2 out of 6 cases of infection with pseudo-dysentery bacillus.

The results of the first method are apparently by far the better ; yet the second (paraffin) method is more practical. The method may be of special importance where certainty is called for about the character of dysentery epidemics in places far away from the laboratory. In such epidemics the bacteriological confirmation even of one or two cases is of paramount importance. The author actually succeeded in obtaining positive results in this way in 4 samples sent to the laboratory from long distances and kept for 5–14 days (3 samples were negative). *W. J. Bais.*

AMEDEO (Mattei). Su di alcuni casi di cistite amebica da " E. vesicalis."—*Ann. di Med Nav. e Colon.* 1932. Jan.–Feb. 38th Year. Vol. 1. No. 1/2. pp. 24–47. With 6 figs. on 1 plate.

ANDERSON (Hamilton H.). Current Medical Problems of Central America, with Special Reference to the Treatment of Amebiasis.—*Southwestern Med.* 1932. Mar. Vol. 16. No. 3. pp. 110–113.

CANNAVO (L.). Su di alcuni aspetti clinici dell'epatite amebica —*Riforma Med.* 1932. Mar. 26. Vol 48. No. 13. pp 471–478. [13 refs.]

GAGLIO (Vito). Sull' amebiasi nei suoi rapporti con la chirurgia.—*Riv. Sanitaria Siciliana.* 1932. Apr. 1 & 15. Vol. 20. Nos. 7 & 8. pp. 468–470, 473–477 ; 522–524, 527–534, 537–540. English summary (9 lines).

GRIFFIN (M. F. N.). The Death of an Entamoeba.—*Jl. Roy. Army Med. Corps.* 1932. May. Vol. 58. No. 5. pp. 371–372.

HÉRIVAUX (A.), RAKOTOSON (J.) & RANOARIVONY (E.). A propos d'un cas de dysenterie bacillaire dans le Sud-Ouest de Madagascar.—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp 374–375.

HIYEDA (K.). Intestinal Amoebiasis.—*Jl. Oriental Med.* 1932. Sept. Vol. 17. No. 3. [In Japanese. German summary pp. 17–20.]

HOLL (Gustav). Ueber einen atypischen Fall von Amöbenruhr.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Sept. Vol. 36. No. 9. pp. 500–502. With 1 fig.

HOOD (Alexander). Dysentery.—*Jl. Roy. Army Med. Corps.* 1932. May. Vol. 58. No. 5. pp. 350–360.

Lama (Angelo) Epatite con incipiente ascesso e pregressa appendicite da amebiasi —*Arch Ital Sci Med Colon* 1932 July 1 Vol 13 No 7 pp 426–433 English summary (2 lines)

Karczag (L) Ueber das Striasyndrom bei Dysenterie —*Deut Med Woch* 1932 Feb 12. Vol 58 No 7 pp 249–250 [6 refs]

Klein (S A) Een geval van balantidiosis bij den mensch —*Nederl Tijdschr v Geneesk.* 1932 Oct 29 Vol 76 No 44 pp 5050–5057 With 4 figs on 1 plate English summary (3 lines) [13 refs]

Lawrence-Smith (A M) Unsuspected Amoebic Dysentery with Hepatitis —*Jl Roy Nav Med Serv* 1932 Apr Vol 18 No 2 pp 135–136 With 1 chart in text

Moretti (Agostino) Contributo alla conoscenza delle coliti da " Balantidium coli "—*Policlinico* Sez Prat 1932 June 13 Vol 39 No 24 pp 922–925

Moschini (S) Contributo allo studio della cistite amebica nell'infanzia —Reprinted from *Riv di Clin Pediatrica* 1932 Vol 30 No 5 16 pp [54 refs]

Nandi (P) Treatment of Bacillary Dysentery —*Calcutta Med Jl* 1932 Mar Vol 26 No 9 pp 368–382

Panayotatou (Angelique) Sur un cas de " grippe " compliqué d'" amibiase "—*Arch Ital Sci Med Colon* 1932 July 1 Vol 13 No 7 pp 390–392

Reed (Alfred C) & Johnstone (Herbert G) Method for Diagnosis of Amebiasis —*Jl Amer Med Assoc* 1932 Aug 27 Vol 99 No 9 p 729

St John (J H) A New Medium for the Cultivation of *Endamoeba histolytica* —*Amer Jl Trop Med* 1932 July Vol 12 No 4 pp 301–305 With 1 fig

Ségal (J) Amibiase et anémie pernicieuse —*Rev Méd et Hyg Trop* 1932 May–June Vol 24 No 3 pp 154–157

Skinner (A H) & Gillison (K) Acute Pericardial Effusion simulating Hepatic Abscess —*Chinese Med Jl* 1932 May Vol 46 No 5 pp 465–472 With 1 chart in text.

Snijders (E P) Over het leverabsces in de Tropen —*Nederl Tijdschr v Geneesk* 1932 Mar 5 Vol 76 No 10 pp 1066–1080 With 3 text figs

Spangenberg (Juan Jacobo) Sobre un caso de hepatitis amebiana dando un síndrome de oclusión intestinal a repetición —*Arch Argentinos de Enferm Aparato Digest y Nutric* 1931 Dec Vol 7 No 2 pp 165–184 With 8 text figs

Vialatte (E F C) & Remontet (J F) Contribution à l étude clinique de l'hépatite amibienne congestive —*Arch Méd et Pharm Milit* 1932 Apr Vol 96 No 4 pp 381–409 With 7 charts [14 refs]

Woodcock (H M) Proteolytic Ferment in Amoebic Dysentery [Correspondence]—*Lancet* 1932 Oct 29 p 972

MISCELLANEOUS.

UNITED FRUIT COMPANY, BOSTON, MASS. TWENTIETH ANNUAL REPORT. MEDICAL DEPARTMENT. 1931. Section I. pp. 3–33.—**Comments on Some of the More Important Diseases occurring in the Tropical Divisions.**

The extent and scope of the work of this medical department is seen from the following data—The employees in 1931 numbered 73,251 of whom 65,680 were located in the tropical divisions with 76,640 non-employees (families of employees and others). The personnel of the medical department includes 45 physicians and laboratory technicians [the list of staff shows 51 with medical qualifications]. 22,752 patients were treated in the 10 hospitals and the average number daily was 724. The average treated daily at dispensaries was 1,027. A table of causes of morbidity and mortality gives for hospital cases (morbidity), malaria (4,918), diseases of digestive system, influenza, injuries, venereal diseases, in that order; and for dispensary cases similar frequencies, with ulcers a prominent feature. For deaths pneumonia is easily first, followed by malaria, heart disease, tuberculosis, diarrhoea, nephritis. Notes follow of the more prevalent diseases. Of venereal diseases it is said that they " probably rank next to malaria as a cause of lowered vitality and resistance in the tropical countries where our plantations are located. Their enervating and debilitating effects undoubtedly are as prevalent and more destructive of human energy and life than those of hookworm." A small epidemic of infectious jaundice in Colombia is discussed at some length; in one of the first cases death resulted with symptoms suggestive of yellow fever. In 1930 and 1931, 58 cases, all natives, were admitted to the Santa Marta hospital with 8 deaths; no foreigners have been affected which, together with the absence of epidemic, is against yellow fever. Investigation is being continued.

The bulk of the " comments " concern malaria.

> " Despite the most strenuous efforts and the utilization of all known means of anti-malarial measures, the incidence of malaria can be reduced only to proportions which do not materially handicap the individual or the community; but total eradication of the disease seems to be almost an impossible accomplishment with the present knowledge and conditions "

Table G (p. 31) shows the ratio of aestivo-autumnal infections to tertian infections from year to year in two divisions; the author cannot offer any satisfactory explanation for the fluctuations in the relative proportions; the rainfall, he states, is not a determining factor. The number of employees per thousand per annum admitted to hospital for malaria has fallen from over 200 in 1925 and 1926 to 85 and 56 in 1930 and 1931. It is calculated that the anti-malaria work has resulted in 6,168 less cases of malaria among employees, 7,738 less hospital admissions and 107,283 less days in hospital than there would have been if the rates had continued the same.

Some antimalarial measures are not easily carried through when " not infrequently, physical violence is threatened when sanitary inspectors, farm foremen and other employees in charge of labor units, endeavor to persuade laborers and members of their families to take the daily doses of quinine and plasmochin for a sufficiently extended period to effect a cure and to render them non-infectible to mosquitoes."

The antimalarial measures employed are described. Briefly they consist of those which keep anophelines at a distance; removal of

TABLE G.

Year.	Almirante Division.				Costa Rica Division.			
	Tertian Cases.	E.A. Cases.	Percentage of E.A. Cases.	Hemoglobinuric Fever Cases.	Tertian Cases.	E.A. Cases.	Percentage of E.A. Cases.	Hemoglobinuric Fever Cases.
1931	6	92	93·88	3	3	466	99·36	28
1930	3	111	9[illegible]·31	13	2	516	99·61	25
1929	17	211	9[illegible]·54	6	61	702	92·00	21
1928	21	412	[illegible]5·15	7	634	499	44·04	22
1927	111	231	37·54	4	653	484	42·57	39
1926	454	62	12·02	4	602	679	53·01	32
1925	808	40	4·72	9	262	367	58·35	17
1924	1,045	34	3·25	9	288	271	48·48	18
1923	981	86	8·06	11	739	173	18·97	15
1922	828	38	4·39	5	811	117	12·61	15
1921	467	15	3·11	9	550	97	14·99	12
1920	324	28	7·95	7	1,068	17	1·57	9
1919	448	43	8·76	7	703	19	2·35	11
1918	193	18	8·53	4	132	12	7·79	11
1917	149	33	18·13	7	177	82	31·66	2
1916	161	28	14·81	6	85	230	73·02	3
1915	135	42	23·73	8	48	255	84·16	7
1914	305	442	59·17	10	65	711	91·62	37

water which serves or might serve as breeding ground or its treatment with oil or Paris green; field surveys with treatment of infected persons, or the whole camp when infections exceed 25 per cent., with quinine and plasmochin. Measures such as screened quarters, destruction of adult mosquitoes, mosquito nets, mosquito repellants, are impracticable on the plantations. *A. G. B.*

i. RAINGEARD. La main-d'oeuvre au Kwango (Congo Belge). [**Labour in the Kwango District (Belgian Congo).**]—*Rev. Méd. et Hyg. Trop* 1932. Jan.–Feb. Vol. 24. No. 1. pp. 21–48.

ii. REVUE DE MÉDECINE ET D'HYGIÈNE TROPICALES. 1932. May–June. Vol. 24. No. 3. pp. 133–148. With 1 map —La main-d'oeuvre au Kwango (Congo Belge).—Lettre et rapports de la Cie du Kasai.

iii. HARMEGNIES. Rectification à propos de l'article du Dr. Raingeard.—*Rev. Méd. et Hyg. Trop.* 1932. July–Aug. Vol. 24. No. 4. pp. 180–182.

i. In a long article Dr. Raingeard indicts the management and treatment of native labourers in the Kwango district of Belgian Congo, where palm oil and rubber are produced in large quantities and where the author spent nearly four years as medical officer. He suggests that this district has been industrialized too rapidly and that the natives have suffered severely in the process. The regulations of the State made for their protection are disregarded. He speaks of their state as industrial slavery. He gives many details for which interested persons must consult his paper.

ii. The Compagnie du Kasai at Brussels writes that Dr. RAINGEARD was in its service and his charges concern the company, in which the State is not interested. They do not meet the charges directly but publish the report of the second semester of 1931 on trypanosomiasis and the report of the medical service for 1931 both by the Chief Medical Officer, Dr. HARMEGNIES.

iii. Dr. Harmegnies challenges Dr. RAINGEARD's figures of trypanosome infection. He and a colleague have re-examined the population of 28,000 and find that it is increasing and that the births exceed the deaths. *A. G. B.*

CHESTERMAN (Clement C.). **The Training and Employment of African Natives as Medical Assistants.**—*Proc. Roy. Soc. Med.* 1932. May. Vol. 25. No. 7. pp. 1067–10^{1}4. (Sect. Trop. Dis. & Parasit. pp. 27–34).

This is an admirable article which no one concerned with its important subject should miss. The author writes from eleven years' experience at a mission station, Yakusu, Belgian Congo. He notes that the Colonial Governments in Tropical Africa are now addressing themselves seriously to the task of providing medical and sanitary services for natives in rural areas, so that the time is ripe for examining the situation as a whole as regards aims, policy and practice. The density of population in Tropical Africa is remarkably low. It rarely exceeds 15 to the square mile; in Nigeria, Sierra Leone and Gambia it is about 50, whereas in Java it is no less than 686. The paucity of the population in spite of the pacification of the country is due to disease and the absence of hygiene. "The application of our knowledge is lagging too far behind the acquisition of it."

The difficulties are however great and are not merely geographical and administrative. There is the animistic belief in the spiritual causation of disease, either the witch or the shades of ancestors, which creates suspicion of measures which ignore these beliefs. The animist believes that he goes deeper than we to the cause of the trouble, for he isolates those who cause disease (witches, etc.) while we concern ourselves more with those who have it. The only solution is the training and employment of subordinate native staffs. Dr. Chesterman then deals with the objection that the negro's mentality is such that he cannot be trained or, when trained, trusted and suggests that the arrest of development at the age of puberty is a protective mechanism against an education illsuited to the actual needs of adult life. Simple medical education and practice are eminently related to his needs and environment and here he can make considerable progress while constantly kept in contact with the facts. What is needed is "the boy who has had the irreducible minimum of theoretical training, coupled with a sound practical experience in routine treatment and prevention, and who will thereafter work under regular supervision."

Passing over the section of the paper in which is described present-day practice in Sierrà Leone, Gold Coast, Nigeria, the Sudan, Uganda, Tanganyika Territory, Nyasaland, we come to Belgian Congo. Here there are four official medical schools at the provincial capitals, in which about 150 students are undergoing a five year course to qualify as *infirmiers*. Proficiency in French and arithmetic is a prerequisite, three years are spent in theoretical and practical study, and two as a stage in some medical or sanitary formation before the final examination is taken. Chesterman feels that this limited training of native boys in rural hospitals whether government or private, as opposed to concentration at the large hospitals, is a sound policy.

He then describes his own experience at Yakusu. Students aged from 13 to 20 are admitted by competitive examination, the important subjects being French and arithmetic, they are provided with uniform and rations and live in a hostel The curriculum, which covers three years, is described Practice and theory are combined from the outset and all boys are delegated in monthly rotation to the performance of duties suited to their year whether in the wards or out-patient department The text book used is the "African Dispensary Handbook" [reviewed in this *Bulletin*, Vol 27, p. 85] After qualification boys are employed as monitors for a year at the training hospital before being sent to rural dispensary or medical post They contract to give at least three years service and start at about £2 a month In the rural dispensaries standard fees are charged, to cover the cost of drugs and dressings The aim is to place these dispensaries at central market villages not less than 15 miles apart and to develop round them welfare centres visited once a week by a second assistant or trained woman He finds that boys are capable of rendering faithful and efficient service even when visited only once or twice a year, but a three-month interval is preferable

Dr Chesterman goes on to make suggestions to those responsible for framing policies He thinks that an A D M S should be appointed in each Colony with the supervision of medical education as his special duty A new category of medical officers might be formed in the larger colonies looking to this work as a career They should however be also practising at the rural hospitals The A D M S (Education) would be responsible under the D M S for the posting and advancement of the subordinate staff and for unifying the educational program, text books and examinations Laboratory attendants sanitary inspectors and dispensers would be his care Advanced medical education the author does not discuss but he notes that in French West Africa Belgian Congo and Tanganyika Territory higher education has either been modified after trial or not seriously contemplated

Dr J Howard Cook who took part in the discussion said—

> With reference to policy in the training of the African four principles should be recognised —
>
> ' (1) Early training, pre medical and welfare and simple village hygiene, should be in the vernacular A higher medical and nursing training in English (2) Training should be intensive rather than extensive, aiming in the first instance at producing a few thoroughly reliable workers rather than a number of less reliable diplomates and as the credit of the work will depend on the character of the men and women trained every care should be taken in their selection and moral supervision and training (3) All medical training should keep the right balance between theory and practice The African who is trained in theory only gets a swelled head and is often useless when it comes to practical work (4) All elementary education should be correlated to the needs of rural village life *A G B*

KASSIRSKIY (J A) Die Methode der Knochenmarkpunktion bei tropischen Erkrankungen Mittelasiens [**Examination of Bone Marrow in Tropical Disease.**]—*Arch f Schiffs- u Trop -Hyg* 1932 Sept Vol 36 No 9 pp 492–495

For obtaining a sample of bone marrow the author uses a Bier s needle with a guard 1 cm from the point and he punctures the sternum at the level of the third intercostal space after preliminary local anaesthesia with 1·5–2 cc of 1 per cent novocaine 0 5 cc of marrow suffices for haematological and parasitological study

The findings in various tropical diseases met with in Middle Asia (Russian Turkestan) are described —In ***malaria***, contrary to expectations, the marrow shows no peculiarities other than those visible in the peripheral blood. In acute cases there is a marked myeloid reaction which, as the case becomes protracted and chronic, gradually disappears. The blood picture from the aspect of erythropoiesis is that of a mixed "normo-megalo-proerythroblastic reaction with preponderance of normoblasts."

In *kala azar* and *infant kala azar* sternum puncture is, according to the author, preferable to spleen puncture on the ground that the latter is a "blind" procedure which may be, though is not often, fraught with danger. Even if only a small amount of marrow is obtained the number of leishmania bodies seen is usually large. For children he uses a finer needle and, the bone being softer, no anaesthetic is required, since the operation is practically painless. One or two drops are sufficient for examination.

In *relapsing fever* no advantage is gained by examining the marrow; the findings run parallel with those of the peripheral blood. When the spirochaetes are no longer found in the blood they are absent also from the marrow and the blood change is, in general, that of a myeloid reaction both during the paroxysms and the apyretic periods. In *undulant fever* and septic conditions the author has obtained good growths with 5–10 cc. of marrow in 100 cc. of glucose broth.

In *sprue* the marrow is red and presents a megaloblastic picture in varying degrees. Even in anaemia of moderate severity a definite new formation of megaloblasts is obvious—megaloblasts of a lymphoid type and gigantoblasts with nucleus of a delicate structure, nucleoli and basophilic protoplasm, the basophilia varying in degree, and showing transitions from the initial forms (erythrogonia) to fully developed megaloblasts possessing ambliochromatic nuclei with the chromatin disposed in the "wheel" form and a polychromatophilic or orthochromatic protoplasm. It is interesting to note that this megaloblastic condition can be seen quite early in the disease when the anaemia is but slight, indicative of a specific reaction on the part of the bone marrow; nevertheless this does not necessarily persist but changes to a normoblastic reaction as recovery ensues.

In *pellagra* there is also a megaloblastic and proerythroblastic type of reaction, but not to the same degree as in sprue or in Addison's anaemia. The anaemia is of the hypochrome variety (60–70 per cent.) with absence of any haemolytic signs. This is of importance in distinguishing pellagra from conditions otherwise resembling it.

H H. S.

RADSMA (W.) & STREEF (G. M.). **On Metabolism during Rest and Protein-Consumption in Europeans Living in the Tropics.**—*Arch. Néerlandaises de Physiol. de l'Homme et des Animaux.* 1932. Vol. 17. No. 1. pp. 97–123. [23 refs.]

An earlier study by one of these authors [Vol. 29, p. 235] showed that the basal metabolism of young Europeans resident in Batavia was lower than the normal figures given by BENEDICT and HARRIS and by DU BOIS. The study has been extended to include the measurement of urinary nitrogen excretion and to investigate the influence of the protein content of the diet on the basal metabolism. In the majority of subjects there is a lowering of the basal metabolism which in a group of 24 amounted to an average of 6·3 per cent. below the standard figures of Benedict. A particular group of nine subjects was investigated after a residence of 3 months and again after 2 years in Batavia and although the metabolism figures remained approximately the same the difference for the standard values of Benedict had lessened from —10·6 per cent. to —7·5 per cent. owing to the fact that nearly all the subjects had lost weight in the 2 years. On the basis of the nitrogen excretion figures it is concluded that there are no serious differences in the protein consumption of the subjects of these tests and the American students who served for fixing the standard figures of Benedict and Harris. The lower values for the basal metabolism of Europeans in Batavia are not to be explained by any lessened protein intake. *M. E. Delafield.*

RADSMA (W.), STREEF (G. M.) & KLERKS (J. V.). Over het zuurbase evenwicht bij tropenbewoners. Eerste mededeeling: Over de reactie der urine, in 't bijzonder der onder "basale" voorwaarden verkregen morgenurine, bij tropenbewoners. [**On the Acid Base Equilibrium in the Tropics. I. Reaction of the Urine, especially the Morning Urine under "Basal" Conditions in the Tropics.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June 7. Vol. 72. No. 12. pp. 798–807. With 5 text figs.

The 24 hours' urine of Europeans in the tropics is more alkaline than that of the natives; the morning urine of Europeans is often alkaline (pH>7), this is rarely so in natives. Whether the difference in reaction is to be ascribed only to the more acid food of the natives (rice) or also to differences in the intermediate metabolism, respiration or perspiration is still to be decided.

The greater oscillations in the reaction of the urine in Europeans gives rise to interesting speculation as to their causes which, however, cannot be concisely reported upon. *W. J. Bais.*

MOUSTARDIER (G.). L'ulcère phagédénique des pays chauds et son traitement par l'émétique. [**Treatment of Phagedaenic Ulcer by Tartar Emetic.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 333–339.

——. Traitement de l'ulcère phagédénique tropical par les injections intraveineuses d'émétique.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1932. Apr. Vol. 10. No. 3. pp. 264–267.

The author, who writes from the convict station of Poulo-Condore in Indochina, says that tropical ulcer, almost always on the legs and feet, forms 10 per cent. of all diseases treated. The proportion is apparently raised by intentional ill treatment of slight wounds by the prisoners. It was found that treatment by 914 or sulpharsenol hastened recovery but these drugs were too expensive for general use. The author therefore tried another spirillicide, tartar emetic, in one per cent. solution, intravenously. On the day preceding the patient is purged. On the 1st day he receives 2 cc. of the emetic, on the 3rd 3, on the 5th 5 and on the 7th 10 cc., then every other day 10 cc., to a total of 1·2 gm. Concurrently the wound is cleaned with alcohol and covered with dressings kept moist with hydrogen peroxide. After the 2nd or 3rd injection the phagedaenic process is arrested and after the 4th or 5th has disappeared. As a rule 0·4–0·5 gm. of the drug is enough. One patient only had untoward symptoms and these were checked by the use of adrenalin. A brief account follows of 30 cases thus treated in which recovery ensued in from 7 to a maximum of 25 days. *A. G. B.*

SAYERS (Edward G.). **The Treatment of Tropical Ulcer by the Method of Dickson Wright.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. pp. 49–54.

Dickson WRIGHT described his method of treating varicose and indolent ulcers of the leg in papers in the *British Medical Journal* and elsewhere in 1930 and 1931. The treatment seems to depend on two main propositions—that healing fails because of the grave circulatory difficulties in varicose ulcers, and that hermetical sealing with sticking plaster will promote healing better than anything else will. The method is described. The author, who writes from the Methodist Mission Hospital, Bilua, British Solomon Islands, used ordinary adhesive plaster and describes a series of ten cases in all of which success was attained. The leg is firmly encased from foot to knee in a 3-inch spiral bandage and ordinary activities are carried on. Discharge is disregarded. The bandage is changed once a week. Ulcers of all types were treated. The estimated cost is about a shilling a week. The method is particularly suited to natives, who tire of in-patient treatment or daily attendance. *A. G. B.*

ANDERSON (T. Farnworth) & ROBERTS (M. A. W.). **The Treatment of Ulcers by Skin Grafting.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. June. Vol. 9. No. 3. pp. 79–83.

Treatment by excision and grafting was described by BRENNAN [this *Bulletin*, Vol. 28, p. 839] and this method has been followed with the results noted—

No. of ulcers treated by skin grafting	154
No. of ulcers excised before grafting	112
Average total days in hospital of ulcer cases skin grafted	31·0
Average days in hospital after skin grafting (all cases)	19·6
Average days after skin grafting of cases in which whole graft took	14·9
No. of cases in which whole graft took	103
No. of cases in which more than half took	25
No. of cases in which less than half took	19
No. of cases in which graft failed	7

The average time spent in hospital by 100 cases treated by ordinary methods was 66·7 days ; the corresponding figure in the skin grafted series was 31·0. The ulcer and its base are removed with a sharp scalpel. For details the paper must be consulted. In one case the ulcer, 8 by 6 inches, was of 5 years' duration, and the patient had previously spent a year in hospital. Excision and grafting was followed by sound healing in six weeks. *A. G. B.*

ENZER (John). **The Treatment of Ulcers.** [Correspondence.]—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Aug. Vol. 9. No. 5. pp. 148–149.

In reference to ANDERSON & ROBERTS' paper the author writes that of 160 cases treated by him by skin grafting in Mombasa 118 were successes, i.e. the whole graft took, and 12 days only were spent in hospital after the grafting. Protection with or without the simplest dressing was all that was necessary. Where the Thiersch method fails he now employs "pinch grafting," small circular patches of whole skin distributed over the area. Here there were no failures.

A. G. B.

i. LOEWENTHAL (Leonard J. A.). **Calcium Treatment in Tropical Ulcer.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Aug. Vol. 9. No. 5. pp. 136–142.
ii. ——. **Tropical Ulcer as a Deficiency Disease: Treatment with Injections of Calcium.**—*Lancet.* 1932. Oct. 22. pp. 889–892.

i. In September 1931 treatment of tropical ulcer by injections of calcium was started at the Mbale hospital, and with such success that 4 weeks later the S.M.O. made it a routine measure first at the hospital and then at 7 sub-dispensaries. Grains 15 of calcium chloride in 10 cc. of distilled water are injected into the veins daily till cure is complete and, if a case proves resistant, the dose is doubled. Offensive odour is lost in the first week, sloughs in the second, and in the third there is a healthy granulating surface with rapidly extending epithelialization. Of the first 69 cases in only 11·6 per cent. was no improvement noted and this because the majority had disappeared in a week or less. The advantages of the treatment are cheapness, a month's supply of the drug for one patient costing less than 10 cents; convenience in that the whole treatment can be carried out by a native dresser; and employment of mass-therapy because outlying districts can be looked after by natives. Probably scraping and skin grafting would have shortened the treatment. The author goes on to discuss native diets showing that the bulk of his patients lived on plantains and plantain flour, which are deficient in both calcium and fat. He notes that tropical ulcer is never seen in chiefs, houseboys or prisoners, and in these classes the diet is more adequate. He also cites the Masai with a meat, blood and milk diet, and 3 per cent. ulcers contrasted with the Kikuyu, vegetarians, with 33 per cent., but notes that here as in the other cases absence of suitable protein may play a part. It is the calcium balance which is of such great importance. He refers to the work of Forbes BROWN who obtained excellent results in ulcers by administration of parathyroid [see this *Bulletin*, Vol. 28, p. 839] and suggests that its action may be due to withdrawal of calcium from the bones and teeth. He realizes the importance of helminth infections and of food absorption from the alimentary tract, both of which subjects in relation to ulcer require study.

ii. The same author, whose experience is derived from a district in Uganda, says that though hospital records do not show a high death rate in this condition death, according to native chiefs, is the almost invariable result when the patients return to their villages. He thinks that in its mortality and morbidity tropical ulcer may take its place with malaria, plague and trypanosomiasis. MCCULLOCH who studied the disease in Nigeria concluded—"Tropical ulcer is a dietetic ulcer, and the question of causative organisms need not be considered at all"; in this the author agrees. That it occurs sometimes in epidemics should not prejudice opinion in favour of its bacterial origin. It is found among the poorest classes almost exclusively: in his neighbourhood the Baganda are well-to-do and supplement their vegetable diet with meat and milk; natives of Ruanda come in to do the menial work and live on a purely vegetable diet; the vast majority of ulcers are seen in the Ruanda labourers. Clinically there is no appearance of inflammation; the process is one of tissue necrosis on a large scale.

Five hundred cases have now received the intravenous calcium treatment which the author states is superior to all others both therapeutically and economically. *A. G. B.*

FISCHL (Viktor). Chemotherapeutische Prüfung seltener Metalle. [**Chemotherapeutic Trial of Rare Metals.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Aug. 22. Vol. 114. No. 2 pp. 284–288. [12 refs.]

The results of prophylactic and curative trial of 18 trade compounds of 10 rare elements in experimental infection of mice with nagana (Prowazek) and European relapsing fever are here described and summed in a table. The substances shown to be active were—in relapsing fever ruthenium chloride, rhodium sodium chloride and two salts of osmium; in trypanosomiasis "ruthenrot" and rhodium sodium chloride. Fourteen elements are now known to be spirochaeticidal (Vanadium, Gallium, Arsenic, Ruthenium, Rhodium, Silver, Indium, Antimony, Tellurium, Osmium, Platinum, Gold, Mercury and Bismuth) and eight trypanocidal (Gallium, Arsenic, Ruthenium, Rhodium, Indium, Antimony, Gold and Bismuth). He suggests that systematic trial of compounds of Palladium and Iridium would bring these into one or other list. *A. G. B.*

KUHN (Philalethes) & DOMBROWSKY (Karl Heinz). Chemotherapeutische Untersuchungen mit Chinin-Weil bei der Vogelmalaria und der Pneumokokkeninfektion der weissen Mäuse. [**Chemotherapeutic Experiments with Quinine-Weil in Bird Malaria and Pneumococcus Infection of White Mice.**]—*Arch. f. Hyg. u. Bakt.* 1932. July. Vol. 108. No. 4. pp. 188–197.

Quinine-Weil is a compound of quinine base and acidum phenylcinchoninicum or atophan, a white powder readily soluble in water or better in a slightly acid medium, which quickly resolves into its two components. It has an advantage over hydrochloride of quinine in that it is quite tasteless. The authors conclude from their experiments that *Proteosoma praecox* infection in canaries can be cured by Quinine-Weil and by the hydrochloride, and that these drugs have no prophylactic but have a preventive action; that is, given before they do not prevent infection but given from the day of inoculation they do. The treatment produced no untoward symptoms.

It is suggested that Quinine-Weil be employed in human malaria and in pneumonia. *A. G. B.*

ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS. 1932. July. Vol. 21. No. 1. pp. 154–173.—Fonctionnement des services de l'Institut Pasteur pendant l'année 1931. [**Activities of the Pasteur Institute of Tunis in 1931.**]

After an account of changes in personnel 8½ pages are devoted to the antirabic service. 1,686 persons presented themselves for treatment, a slightly lower figure than that of 1929 and 1930, but a figure which testifies to the constant non-observation of regulations by both the population of Tunis and the administrative agents. The number of persons treated was 1,152, 7 of whom succumbed to rabies. Since its foundation the Institute has treated 20,583 persons, with 77 deaths, a fatality of 0·37 per cent.: this excludes deaths in the course of treatment or within 12 days thereafter. An ordinary method of treatment and an intensive method are described. Various data follow. The biting animals included 1,516 dogs, 87 cats, 25 solipeds, 21 ruminants and smaller numbers of other animals including 9 men. There were no paralytic symptoms in the course of treatment. The places of origin of the persons treated is given at length.

During the year 33,610 analyses were made, classed as microbiological, chemical, biological and parasitological. A study of this list gives a good idea of the diseases met with in Tunis. Other tables deal with the vaccines and serums produced for both human and veterinary use.

A. G. B.

ARCHIVES DES INSTITUTS PASTEUR D'INDOCHINE. 1932. Apr. No. 15. pp. 153–182.—Fonctionnement des Services Pratiques des Instituts Pasteur en 1931. [**Activities of the Pasteur Institutes of Indochina in 1931.**]

Saigon.—The number of examinations made in the Laboratory of Human Microbiology was 32,460, about three-fourths for the diagnosis and prevention of infective diseases. In the antirabic service 1,338 persons underwent a full course of treatment with one death, a mortality of 0·08 per cent. The diagnosis of rabies was confirmed by inoculation to rabbits in 85 instances out of 131. Nearly 3 million doses of antivariola vaccine were distributed, the product of 141 buffaloes. Of other vaccines 5,135,849 doses were prepared, including more than 4½ million for cholera. Of therapeutic serums 113,577 bottles were despatched for the treatment of tetanus, diphtheria, dysentery, plague, etc. and 8,000 doses of anatoxin for protection against diphtheria and tetanus, and tuberculin for diagnosis and treatment (Boquet and Nègre). In the antituberculosis service 4,573 examinations were made. Of BCG vaccine 101,287 doses were delivered, making a total since 1924 of 479,683 doses, sufficient for more than 159,800 children. The antimalarial service has a personnel of two doctors, an entomologist and an assistant, all Europeans, besides Indochinese. Its activities are described. Plasmodia were found in 2,668 cases (834 *P. vivax*, 331 *P. malariae*, 1,503 *P. falciparum*). This laboratory does some veterinary work, but the bulk of this is undertaken at Nhatrang.

The service of chemistry examines biological products, looks after water supplies, investigates food and drink for adulteration and conducts biological research. Thus it turned out in this year 200,000 0·25 gm. tablets of chaulmoogric acid for the treatment of leprosy.

Hanoi.—The activities of this Institute are similar to those of Saigon. Antivariolar vaccine, to the extent of 4,723,810 units were supplied to Tonking, North Annam, the Kwang Chau Wan territory, and to consular posts and missions in China. Here also antimalarial work is actively pursued: two doctors and an entomologist are employed.

The third Pasteur Institute, Nhatrang, is concerned entirely with animal pathology, chiefly rinderpest. *A. G. B.*

RIFORMA MEDICA. 1932. July 16. Vol. 48. No. 29. pp. 1115–1116.—L'idiosincrasia chininica e la sua cura. [**Idiosyncrasy to Quinine and its Treatment.**]

The manifestations of idiosyncrasy to quinine dealt with in this note are the scarlatiniform rash and urticaria with or without dyspnoea (fenomeni pseudo-asmatici). The pseudo-scarlatinal form is differentiated from true scarlatina by the absence of the other symptoms of the latter—high fever, vomiting, sore throat. Also, the rash appears suddenly and is generalized, it varies in intensity from time to time, and is accompanied by lowering of blood pressure and decrease in leucocytes.

Quinine urticaria, the author states, is easily diagnosed from ordinary urticaria; the "predominating signs are gastro-intestinal or respiratory disturbances" [but these may accompany urticaria of any origin]. Whichever form the rash assumes, if due to quinine it usually appears within an hour or so of the drug being taken, the dose has usually been large, and a repetition of the quinine will cause a fresh appearance of the rash. The author finds on enquiry that the symptoms arise when a dose of quinine is given after an interval which has allowed the preceding dose to be completely eliminated.

Hence, in treatment, to avoid such signs of idiosyncrasy, stress is laid on the administration of doses after the first within this interval, that is, before the preceding dose has been eliminated. If this cannot be done, he recommends that the reaction be provoked on the day on which there would not be a malarial paroxysm, and that the dose should be small. His own method of procedure is to give an injection of 10 cgm. of quinine; if after an hour there is no reaction he injects another 25 cgm., this will lead almost certainly to a reaction. If this is brief, the injection is repeated the same evening; otherwise it is postponed till the next morning and thereafter the injections are continued daily till the malaria is cured.

A useful note of warning is given. The symptoms described, though following the administration of quinine, must not be too hastily attributed to the drug; they may be due to the malaria itself and if treatment be withheld on the former assumption there may be a rude awakening in the supervention of malaria in a pernicious form. Under these circumstances (that the rash is due to the malaria and not the quinine) the patient will usually state that he has previously been able to take quinine without any such unusual effect.

H. H. S.

LINDÉN (Oskar). Weichteilverkalkungen nach Chinininjektionen. [**Calcareous Infiltration of the Soft Parts after Quinine Injections.**] —*Acta Radiologica*. 1932. Vol. 13. No. 1. pp. 57–63. With 5 figs. (4 on 2 plates). [28 refs.] English summary (5 lines).

These infiltrations as shown by X-rays are figured. They were seen in two cases in the pelvic region and upper thigh. Both patients had suffered from malaria about 15 years earlier and had received intramuscular and possibly subcutaneous injections of quinine, in one instance about 15 injections, in the other about 100 in the course of 5 years, resulting in abscesses and fistulae. In one the dose was known to be 0·5 gm. of the hydrochloride. *A. G. B.*

CHOPRA (R. N.) & MUKHERJEE (B.). **Indian Ipecacuanha.**—*Indian Med. Gaz.* 1932. Feb. Vol. 67. No. 2. pp. 88–90.

Another of the I.R.F.A. Indigenous Drug Series. Ipecacuanha is obtained from *Psychotria ipecacuanha* Stokes, a small plant indigenous to Brazil, the moniliform roots of which constitute the drug of commerce. Columbian ipecac is obtained from another species. Many Indian plants which have been regarded as substitutes are described or mentioned but none of these contains emetine. The ipecac plant was introduced in 1866 to experimental nurseries in India but it was not till 1921 that the report of the Bengal cinchona plantations sounded an optimistic note about its culture. Now 226,000 plants are grown in Mungpoo and other plantations with great success in Burma.

The Brussels Conference agreed that powdered ipecac should have an alkaloidal strength of at least 2 per cent., and this is the case with the Columbian and Indian roots as well as the Brazilian ; 70 per cent. in the Indian root is emetine against 72 in the Brazilian ; and the emetine content, it is reported, is now improved at Mungpoo. A quantity of Indian emetine was tested at Calcutta and was found to possess practically the same physical and chemical characteristics as a standard sample obtained from a reliable firm in Germany. Tried in cases of amoebic dysentery it gave very satisfactory results. The authors note that the Federated Malay States is now one of the chief sources of supply, which should encourage the Indian growers. The important factor in cultivation is moderately high altitude and little fluctuation in daily temperature.

[When the authors say that dysentery is one of the important causes of morbidity in the British and Indian Army they apparently fail to appreciate the fact that most of this is bacillary dysentery, in the treatment of which emetine is worse than useless. (See this *Bulletin*, Vol. 28, pp. 16–17.)] *A. G. B.*

EPSTEIN (David). **The Actions of Emetine and Cephaeline on the Circulation, Uterus and Intestine.**—*Quarterly Jl. Pharm. & Pharmacol.* 1932. Jan.–Mar. Vol. 5. No. 1. pp. 21–32. With 11 text figs. [12 refs.]

This work was done in the Department of Pharmacology, University of Cape Town ; the experimental animals were cats.

" It has been shown that emetine and cephaeline, when given in *large* doses, have a depressant effect on the heart, emetine being about one and a half times as active as cephaeline. The action is a direct one on the heart muscle and conducting tissue. The heart-beats are slowed and weakened until they gradually fade away, but various irregularities, *e.g.*, ventricular fibrillation and auriculo-ventricular heart-block may precede the final failure of the heart. While the effects described above are unlikely to be seen with therapeutic doses of the drugs, the sudden entry of strong concentrations of the alkaloids into the heart, as would occur if strong solutions were rapidly injected intravenously, might produce undesirable symptoms. It would appear safer, therefore, to avoid the use of the intravenous route when giving these drugs.

" Subcutaneous minimum lethal doses prove fatal after several days, death being largely due to respiratory failure. In these subacute or chronic cases of poisoning cephaeline is one and a half times as toxic as emetine. This type of poisoning is more likely to be seen clinically than the acute type."

"Both drugs produce marked dilatation of the coronary vessels.

"Both alkaloids in strong concentrations cause relaxation and depression of the uterus and intestine. Weak concentrations may cause contraction of the uterus." *A. G. B.*

CHOPRA (R. N.), DIKSHIT (B. B.) & CHOWHAN (J. S.). **Pharmacological Action of Berberine.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1193–1203. With 2 graphs. [11 refs.]

——. **Berberine and Berberine-containing Plants in Pharmacology and Therapeutics.**—*Indian Med. Gaz.* 1932. Apr. Vol. 67. No. 4. pp. 194–197.

Berberine is of interest to us because of its well-known action in oriental sore. It occurs chiefly in *Berberis aristata* and other members of the Berberis order and also in *Hydrastis canadensis* (golden seal) to the extent of nearly 2·5 per cent. A crude extract made from berberine plants is used in indigenous medicine and is sold in India under the name "rasaut." JOLLY used "rasaut" for oriental sore in 1911 but without giving an opinion on its value. One of the authors and Das GUPTA found that a dilution of 1 in 80,000 berberine inhibits the growth of *Leishmania tropica* in a modified NNN medium; this action is specific. [See this *Bulletin*, Vol. 26, p. 752.] The authors tested berberine in malaria, giving the sulphate in doses of 3 to 5 grains three times a day. In nine instances no effect was produced, though quinine controlled the temperature and banished the parasites. In oriental sore a 2 per cent. solution injected at the base of the sore produces healing after 2 or 3 injections.

Here we have an account of the toxicity of the drug, its absorbability, its fate in the body, its effect on the cardio-vascular system and on the vasomotor centre, as well as on the respiratory system, uterus and bladder. *A. G. B.*

CHOPRA (R. N.) & MUKHERJEE (B.). **Thymol, Menthol and Camphor from Indian Sources.**—*Indian Med. Gaz.* 1932. July. Vol. 67. No. 7. pp. 361–365.

There is a great demand for these three drugs in India and large quantities are imported. The authors here examine the possibility of their manufacture in India on a commercial scale. The natural sources are described and the possible sources in India, but in each case there is a synthetic product which threatens the existence of the natural one and is likely to displace it in the near future. As a source of thymol they suggest the cultivation of eucalyptus from which piperitone, readily converted into thymol, can be produced at small cost.

A. G. B.

HILLENBRAND (Karl). Schwerhörigkeit nach Chenopodiumölvergiftung. [**Loss of Hearing after Oil of Chenopodium Poisoning.**] —*Muench. Med. Woch.* 1932. July 15. Vol. 79. No. 29. pp. 1152–1153.

A healthy woman operative aged 56 took at a physician's direction for "worms" 6 capsules of 16 drops each of chenopodium oil within 1–2 hours; 12 worms were passed. Three weeks later she received

80 drops within a short period. An hour later she became giddy, vomited and had a rushing in the ears. These and other symptoms continued. Five weeks later there was still tinnitus and difficulty of hearing, as well as disturbance of equilibrium. She came to the throat and ear clinic at Tübingen where the lesion was found to be one of the internal ear. The author points out that with chenopodium the dose of 16 drops should not be exceeded, nor a total quantity of 38 drops (1 cc.) ; it must be followed by a purgative ; and must not be given on more than two consecutive days [see also this *Bulletin*, Vol. 23, p. 481 ; Vol. 25, p. 418 ; Vol. 27, p. 66.] *A. G. B.*

McKenzie (Alan). **Fatalities following the Administration of Intravenous Tartar Emetic.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Mar. 31. Vol. 25. No. 5. pp. 407–410.

In this paper four deaths are reported in African natives suffering from urinary schistosomiasis undergoing treatment with intravenous tartar emetic. In seven other cases toxic symptoms appeared followed by recovery. In all, except one patient who recovered, the antimony tartrate was placed in a sterile glass-stoppered bottle with sufficient chloroform to make 2·5 per cent. of the final solution ; this was periodically agitated for 48 hours, when sterile 0·5 per cent. sodium citrate in water was added to produce a 5 per cent. solution of tartar emetic. Each batch was used during a period of 14 days and rejected if the odour of chloroform had disappeared or if the solution was not clear. The four fatal cases were all treated with different batches of this solution.

The mild toxic features included tiredness, slow pulse, increased respiration, vomiting and generalized pains. Severe cases showed great mental restlessness, respiratory distress, and later coma, with loss of all reflexes. Three presented hepatomegaly and coffee ground vomiting, but only one was jaundiced. Most of the cases showed a leucopenia with a relative lymphocytosis ; band forms and metamyelocytes were numerous. At autopsy the liver was enlarged and pale, the spleen dark and congested, while the mucosa of the intestinal tract showed purpuric tendency in some cases. Microscopic section revealed fatty degeneration of the liver cells with destruction of cytoplasm, but little or no change in the nucleus. The kidneys presented congestion, toxic changes in the tubule cells and fine areas of haemorrhage. One batch of solution used in 6 of the 11 cases was investigated bacteriologically five weeks after it had been made up and non-motile bacilli were then found resembling somewhat Klebs-Loeffler bacilli. Two experiments made with this on rabbits showed that boiled and filtered solution proved more toxic than the unboiled solution, a finding which suggested that the toxic body may have been formed by dissociation of the antimony salt rather than by bacterial agency.

N. Hamilton Fairley.

De (M. N.). **Some Facts about the Incidence of Splenomegaly in Bengal.**—*Indian Jl. Med. Res.* 1932. Apr. Vol. 19. No. 4. pp. 1029–1033.

During a period of ten years, 1920–29, the total number of autopsies in the medical college group of hospitals, Calcutta, was 977. In 525 of these the spleens weighed from 200 to 1,500 grams, 100–150 gm. being taken as the weight of a normal spleen.

Number of cases.	Weight in grams.
356	200 to 500
118	500 to 1,000
39	1,000 to 1,500
12	above 1,500

In 203 the organs were felt to be fairly firm and the trabeculae were numerous and very prominent. In all there was generalized thickening of the capsule and in 198 definite evidence of perisplenitis with adhesions to the neighbouring viscera. These capular changes and adhesions were found very infrequent in true kala azar and these changes were independent of the size of the spleen.

Of the 525 cases 98 were diagnosed during life as malaria or kala azar but in at least 24 the autopsy and laboratory examinations failed to support the diagnosis. A series of 54 cases in which the weights varied from 600 to 2,700 grams was studied. Most came from certain districts of Bengal. They run a very chronic course with enormous spleen and liver all the time, and continue to follow their usual profession. They suffer from an irregular type of fever, labelled malaria, leishmaniasis, enteric, etc. Therapeutic measures are futile. A secondary type of anaemia always develops with marked diminution of leucocytes. They tend to develop fibrosis of the liver with ascites. They die of some intercurrent malady. At autopsy capsular changes and adhesions are very frequent.

" The histological examination of these spleens reveals a picture which is consistently found in every one of these cases, with minor modifications. In all of them, the splenic pattern tends to be lost and the malpighian follicles atrophied or totally destroyed. The entire pulp looks cellular, congested and full of many large phagocytic mononuclear cells. In some of the cases, the latter show intense red cell phagocytosis indicating an abnormally increased capacity of the organ for blood destruction. The capsules are thickened and the trabeculae very prominent containing much fibrous tissue. There is also a considerable increase of reticular fibres which appear fairly coarse and numerous when stained with Foot Bielschowsky's method."

During the period under review there were 36 cases of cirrhosis of the liver ; in 21 the average weight of the spleen was about 300 gm. and in 15 900 gm. ; the cirrhosis therefore may be classified in two distinct groups, with and without marked splenomegaly, and the author believes that these groups have separate aetiologies.

[One cannot tell from the paper whether the groups or series discussed are distinct or overlap, and, in the cirrhosis series, whether or not intermediate weights connected the 300 and 900 gram groups.]

A. G. B.

HEWER (T. F.). **Splenomegaly and Infantilism.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 139–146. [15 refs.]

" Seven cases of delayed sexual development are reported [from the Anglo-Egyptian Sudan] ; common factors were splenomegaly, exposure to malaria and bilharziasis, jaundice or a positive van den Bergh reaction, anaemia with low colour index, leucopenia, and eosinophilia. One of the cases attained maturity at the age of twenty-five without any regression of the other symptoms. There was no apparent difference between these cases with infantilism and many others from the same neighbourhood with similar splenomegaly but normal development The relation between the spleen, lipoid metabolism, the thyroid gland and sexual development is briefly discussed but no satisfactory conclusion achieved These cases are reported largely to draw attention to a condition which may possibly be commoner than one would imagine, since the absence of any constant feature other than delayed development makes recognition difficult "

A G B

RUSSELL (Paul F) & WEST (Augustus P) **Charcoal as a Diluent for Paris Green in the Destruction of Anopheles Larvae. Larvicide Studies.**—*Philippine Jl Sci* 1932 July Vol 48 No 3 pp 291–297 With 3 figs on 1 plate

These authors find that a dust spray of wood charcoal with 1 per cent Paris green kills over 80 per cent of larvae in 4 hours, and all the larvae in 24 hours The particles of Paris green must be small enough to be ingested by the larvae, must be distributed to all parts of the breeding area, must float long enough for the larvae to devour them, and must not be dangerous to other living creatures In the Philippines charcoal is readily obtained, easily prepared (by pounding in a primitive pestle and mortar), floats longer than Paris green, is easily distributed and not expensive The cost is about 0 003 dollar per pound A litre of the mixture will treat 100 square metres of surface or along 100 metres of bank *A G B*

ROSS (G A Park) **Bird-Lime for killing Mosquitoes.** [Correspondence]—*Jl Trop Med & Hyg* 1932 Aug 15 Vol 35 No 16 p 256

Dr G A Park Ross, Assistant Health Officer Union of South Africa, calls attention to the value of bird lime as a means of killing mosquitoes and larvae in tanks wells and pools Grass or small twigs are smeared with it and thrown on the surface of the water It is said to be as efficacious as paraffin For pools, sticks with short branches, which project just clear of the water, are used

A G B

GINSBURG (J M) **Airplane Oiling to control Mosquitoes.**—*Science* 1932 May 20 Vol 75 No 1951 p 542 [Summarized in *Rev Applied Entom* 1932 Aug Vol 20 Ser B Pt 8 p 176]

Since in the swamps and marshes of New Jersey, where the larvae of the prevailing mosquitos are primarily bottom feeders, control by arsenical or other dust is either ineffective or not practicable, experiments were carried out during the summer of 1931 to determine the possibility of applying oil or other liquid larvicides by means of an aeroplane Two 50 U S gal tanks were installed in the forward cockpit and connected to a steel pipe, 3 inches in diameter, extending along the bottom of the fuselage and terminating just below the rudder in a cross pipe, 7 feet long and 1½ inches in diameter, perforated with holes, ⅛–¼ inch in diameter, from which the liquid flows A valve, placed at the rear end of the longitudinal pipe and operated by the pilot, controls the flow of oil The aeroplane flies as low as possible, and the liquid flows out as a fine spray, depositing a thin film over the breeding areas By this method both pyrethrum larvicide and oil were tested. The results showed that on a still day a killing film is deposited. In two areas, practically complete kill of larvae and pupae was obtained About 8 acres of a meadow were covered with a killing film of oil in about 40 minutes, the amount required for this being about 140 U.S gals, and the cost of the application less than that of hand oiling."

PONS (R.) Essais de désinsectisation durable du sol sablonneux des cases au Sénégal. [**Disinfection of the Sandy Floor of the Huts in Senegal.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp 539–541.

Fleas are extraordinarily numerous in the sandy floors of these huts; 150–300 specimens may be taken in one in a few hours. The genus is in nearly all cases Synosternus, probably an important plague carrier for specimens collected in a plague-stricken hut infected 6 guineapigs out of 12 injected, and in a village built on laterite in which plague had never occurred no house fleas could be found. After consultation with the local branch of the Standard Oil Company the author selected for trial fuel oil with two-thirds of gas oil. The penetration of this mixture is such that a thickness of 1 cm. impregnates to a depth of 15 cm The author thinks 2 cm should be applied The price per sq metre is 8 francs, giving 50–60 francs per hut. The mixture is applied with a watering can with a rose and adsorption is so complete that the product does not stick to the shoes or feet; it is however advisable to spread a little dry sand on the surface Four huts have been thus treated and after visits 8, 21, and 30 days later no fleas could be found. *A G B.*

DILIBERTO (Ugo) Nota sulla colecistopatia da lamblia [**Lamblia in the Gall-Bladder.**]—*Riv Sanitaria Siciliana* 1932 Jan 15 Vol 20 No 2 pp 113–114, 117-119 English summary (8 lines)

The patient, a man 18 years of age, had suffered at intervals during 8 years from attacks of abdominal pain, particularly in the epigastrium, more frequent during the last 8 months There was neither vomiting nor fever Blood examination showed red cells 3,800,000, white 4,900 per cmm, Hb 73 per cent., C I 0·9 The only other physical signs were those obtained by the duodenal sound Two of three samples of bile contained Giardia One presented no macroscopic changes, but microscopically vegetative forms of the parasite were seen in the deposit, the other was darker, with flocculi which revealed massed Giardia and a few leucocytes.

Serge's treatment with naphthalene, 50 cgm daily in 3 cachets, was given for a week The symptoms cleared up entirely and repeated duodenal sounding since has given negative findings There has been no return of the symptoms though several months have passed

Absence of fever and leucocytosis exclude actual cholecystitis, but the author is of opinion that Giardia can give rise to a "cholecystopathy," analogous to an "appendicopathy" associated with Enterobius without definite appendicitis *H. H. S.*

KOUWENAAR (W.) **Gastric and Duodenal Ulcers in Sumatra's East Coast and their Pathogenesis.**—*Far Eastern Assoc. Trop. Med. Trans. Eighth Congress, Bangkok, 1930. Dec.* pp. 587–595.

It is generally held that gastric and duodenal ulcers are very rare in the tropics. The author's material is derived from 3,161 autopsies made in the Pathological Laboratory and hospitals in Deli, Sumatra; nearly all were indentured labourers.

TABLE I.

	Number of post mortem examinations.	Number of ulcers and scars.
Chinese men	1,370	151=11%
Javanese men	1,269	8=0·63%
Javanese women	399	4=1%
Tamils	123	6=4·9%

A second table gives the number of ulcer patients in age-decennia: this brings out that the frequency of ulcer increases with age, but that the increased liability of the Chinese is present at all ages. The author notes that gastric ulcer in European men on the East Coast of Sumatra is common. He suggests that this greatly increased frequency of gastric and duodenal ulcers in Chinese men as compared with Javanese men is of importance for the study of its causation and the possible reasons for the difference are discussed. Nothing of significance results and the problem remains to be solved. In the discussion SNIJDERS remarked that the specialists on tropical disease in Holland find high figures for gastric and duodenal ulcers among patients long resident in the Dutch Indies. *A. G. B.*

DUBOIS (A.). Note sur la tension artérielle chez les indigènes congolais. [**Arterial Tension of Congolese Natives.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No 2. pp 133–136.

The author has tested the arterial tension of 200 apparently healthy natives of the Mabudu tribe in the region of Pawa, a Red Cross Station in Belgian Congo. He used the auscultation apparatus of Korotkov, with which normal subjects in Europe give maxima of 13–14 cm.; the author's own tension in Africa was 13·5.

The results were as follows:—

4 between 9 and 10·5 cm. (tension very feeble)
30 „ 11 and 12·5 cm. (tension low)
95 „ 13 and 14·5 cm. (tension normal).
49 „ 15 and 16·5 cm. (hypertension light).
20 „ 17 and 20 cm. (hypertension clear).
2 upwards of 20 cm. (20·5 and 25) (hypertension very strong).

Of 50 natives of age apparently below 40, 7 had a tension reaching or exceeding 15 cm. (14 per cent.); of 150 natives over 40, 64 reached or exceeded 15 cm. (42·6 per cent.). He concludes that of Congolese natives living a primitive life a fair number have arterial tension above the normal, but usually moderate. These persons are, as in Europe, relatively old. The clinical manifestations of this state are inconspicuous. The only evident cause is age. [But see DENNISON, this *Bulletin*, Vol. 27, p. 162, where bloodpressure in African natives (Kenya) *diminishes* with age.] *A. G. B.*

RUSSELL (H.) & TAYLOR (C. J. S. O.). **A Case of Sickle Cell Anaemia.**—*West African Med. Jl.* 1932. Apr. Vol. 5. No. 4. pp. 68–69. With 2 coloured plates.

Sickle cell anaemia has been chiefly described in negroes of the United States. ARCHIBALD has reported a case in an Arab boy in the Anglo-Egyptian Sudan [this *Bulletin*, Vol. 24, p. 66].

A case seen in Accra is here described. An African boy of 14 of Ga parentage was admitted for debility. He complained of feeling tired and of breathlessness. He had marked anaemia, thumping heart sounds and a systolic murmur at the base of the heart and in the mitral area. The liver was palpable two fingers breadth below the costal margin; spleen not enlarged. A thin blood film showed spindle and oat shaped red cells, and in a cover glass preparation ringed and kept for two hours most of the cells were crescentic.

Blood count.—Red cells, 1,940,000. White cells, 13,000. Haemoglobin, 50 per cent. Colour index, 1·3. Lymphocytes, 49·5 per cent. Polymorph leucocytes, 37 per cent. Large mononuclear cells, 6 per cent. Eosinophil polymorphs, 6 per cent. Normoblasts, 3. Basophil polymorph, 1–1·5 per cent. Myelocytes, 2. Platelets 1 to 3–4 red corpuscles.

The Wassermann was negative.

The parents and 4 other children of this family were examined. In the cover glass preparations there was sickling in the father's blood and that of a girl of 3.

Sickling has been noted three times in natives of the Gold Coast post mortem, and is probably not rare. *A. G. B.*

ARGAUD (R.). Ostéolyse ainhumique. [**A Case of Ainhum.**]—*Bull. Soc. Path. Exot.* 1932. Apr. 13. Vol. 25. No. 4. pp. 323–325.

DELANOË (E.). Un cas d'ainhum.—*Ibid.* pp. 322–323. With 1 text fig.

Each of these describes a typical case of ainhum which would hardly call for special notice except for the fact that the first patient was a negress and the condition is comparatively rare in women and that the origin of the lesion dated from a definite injury, cutting on a stone, followed by suppuration. The second, in a male of 21 years, is designated cryptogenic on the grounds that it was discovered accidentally after death from pneumonia and no history was therefore obtainable. The morbid histology—thickening of the dermal layers with osteoporosis and absorption of bone—was that usually present. *H. H. S.*

VAN DEN BRANDEN (F.) & APPELMANS (M.). La pathogénie de l'ainhum. [**The Pathogeny of Ainhum.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. June 30. Vol. 12. No. 2. pp. 161–172. [25 refs.]

The authors describe two cases seen at Leopoldville and discuss the etiology in some detail without reaching any conclusion. The pathogenic mechanism of ainhum, they say, is still obscure. Its frequent bilateral localization suggests the intervention of a local factor such as the repeated traumatism to which the bare-footed are exposed, and of a general predisposing factor which eludes them. A page of references is sketchily presented. *A. G. B.*

HUARD. Les myosites et les pseudo-myosites en milieu colonial. [**Myositis and Pseudo-Myositis in the Tropics.**]—*Ann. de Méd. et de Pharm. Colon.* 1932. Jan.–Feb.–Mar. Vol. 30. No. 1. pp. 5–33. [4 pages of refs.]

In explanation of his title the author points out that true myositis, verified microscopically, is rare and what is often termed myositis, namely abscess developed more or less deeply in the juxta-muscular connective tissue, should be called pseudo-myositis. He reviews his subject at length under the headings—(a) Myositis and pseudo-myositis without clinical septicaemia; (b) the same with septicaemia; (c) how to examine a case of myositis, and (d) treatment.

Under (a) he considers that the relation between filaria and multiple abscesses remains to be proved and that an amoebic origin, demonstrated in a well-reported case by SHARP and MORRISON [this *Bulletin*, Vol. 22, p. 347] is very rare. The septicaemic states considered under (b) are those due to staphylococci, streptococci, pasteurella, pneumococci and typhoid, the first of which is by far the most important; he regrets that no animal experiments such as those of ROSENOW have been made in the tropics. In section (c) the author describes at length both clinical and laboratory methods of examination; this should be consulted by those who have to diagnose these conditions. The whole paper, though some of it is elementary, is worth perusal. The numerous references are nearly all French. *A. G. B.*

MONTEL (J.). Un nouveau traitement de la fièvre ondulante par des dérivés de la mélitine et de l'abortine: les formomélitines et les formabortines. [**A New Treatment of Undulant Fever by Formolized Melitin.**]—*Marseille-Méd.* 1932. Apr. 25. Vol. 69. No. 12. pp. 537–543.

Melitin or abortin is prepared by growing the corresponding strain of Brucella in broth for 3 weeks, and filtering through a Chamberland candle. To the filtrate 0·3 per cent. of formol is added, and the mixture is placed in the incubator for 2 months. The product, described as formomelitin or formabortin, is stated to be non-toxic to patients suffering from undulant fever and to possess definite immunizing properties that render it valuable for therapeutic purposes. Treatment is carried out by inoculation of quantities varying from 1–5 cc.; even larger doses may be used. There is practically no local reaction, and the temperature does not rise more than 1°C. Case histories are given of patients treated by this method after other means, including vaccines, had failed, and apparently very favourable results have been obtained. *G. S. Wilson.*

SNIJDERS (E. P.), KOUWENAAR (W.), MAASLAND (J. H.) & WOLFF (J. W.). Onderzoek over rhinoscleroom op Sumatra (2de Mededeeling). [**Rhinoscleroma in Sumatra.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. July 30. Vol. 76. No. 31. pp. 3733–3740. With 2 maps & 1 plate. English summary.

This condition of rhinoscleroma has all the characters of a chronic inflammatory affection in which pure cultures of a capsulated bacillus *Klebsiella rhinoscleromatis* can be obtained from the deeper tissues. An investigation into the locality from which came a series of 11 sporadic cases between 1918 and March 1931 showed that 10 were Bataks.

On the strength of this finding an expedition was planned and made to the island of Samosir in the Toba lake. Here and in the neighbourhood 22 new cases were found. All the facts furnished by these new cases—family relationship, closeness of contact, etc.—pointed to the disease being a slowly infective one. A parallelism is drawn between rhinoscleroma and leprosy as regards duration of contact for infection, the presence of a characteristic bacillus and endemicity. Rhinoscleroma, so far as facts are available, seems to be a disease of an old and primitive people, of which the Bataks are a remnant and possibly also the inhabitants of the Chota Nagpur plateau in British India. Thus the problem becomes to some extent the interesting one of geographical pathology and anthropology. It might be further investigated from this point of view in other localities.

W. F. Harvey.

HERMITTE (L. C. D.). **A Practical Contribution to the Bacteriology and Treatment of Otitis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 189–194.

The author, who has practised for five years in the Seychelles, gives his experience of the part played by *Pseudomonas pyocyanea* in lesions of the external and middle ears frequently met with there. In the period 1927–31 he examined 233 patients for ear trouble and the present paper deals with 56 cases of diffuse inflammation of the external ear, especially those refractory to all forms of local treatment. A short account is given of 21 cases. All were of long duration, in all there was pyocyaneus infection and autopyocyaneus vaccine was almost invariably curative. The bacillus is grown on agar. For detail the paper must be consulted. He suggests that this condition is of wide occurrence in the tropics *A. G. B.*

SHERIF (M. A. F.) *Erythrea spicata* **and** *Glinus lotoides* (**D.**) **or** *Molugo glinus* (**A. Rich.**) **as Antidotes for Scorpion Stings.**—*Jl. Egyptian Med. Assoc.* 1932. July. Vol. 15. No. 7. pp. 460–464.

A popular remedy for scorpion stings in Egypt is what is known in the market as " El Teriak El-Masri," which is prepared from *Erythraea spicata* (Gentianaceae) and *Mollugo glinus* (*Glinus lotoides*) Aizoaceae. The drug was tested subcutaneously in rats and rabbits against scorpion venom. In rats it neither modified the symptoms nor saved life ; in rabbits it appeared as if life was slightly prolonged, but death was not averted. *A. G. B.*

CLUNIE (T.). **Appendicitis in Fijians.**—*Jl. Trop. Med. & Hyg.* 1932. Aug. 15. Vol. 35. No. 16. pp. 241–242.

The author cites a case of acute appendicitis in a Fijian, whose appendix was removed by Dr. HARPER and a case of his own in a Fijian child aged 8. Aubrey MONTAGUE in an experience of nearly 30 years in Fiji never saw a case of appendicitis in the native. During the last 20 years the Fijian diet on plantations and in centres like Suva has changed, meat, rice and white bread taking the place of native roots. It is suggested that the absence or diminution of cellulose and fibre favours the onset of appendicitis. [There seems however little evidence that appendicitis is anything but a rarity.] *A. G. B.*

MOISE (Regolo). Studi sugli eritroconti (V. Schilling) nell'anemia perniciosa, nella malaria ed in altre malattie. [**Erythroconts in Disease.**]—*Ann. di Med. Nav. e Colon.* 1932. July–Aug. 38th Year. Vol. 2. No. 1–2. pp. 385–396. With 6 figs. on 3 plates. [15 refs.] English summary (8 lines).

The author observed in the blood of certain patients with severe anaemia of malarial and other origin, rod-shaped bodies, resembling Bartonella, but reacting differently to stains such as Nile Blue, Giemsa, and May-Grünwald, and differing also from azurophil nuclear residues (Jolly bodies) and the basophile granules of lead poisoning. These bodies have been named erythroconts by V. SCHILLING. With Giemsa stain they are coloured blue or blue-grey, whereas Bartonella are bright red. They are always intracorpuscular and rarely more than one per corpuscle The author does not believe they are artefacts or due, as has been suggested, to folds in the corpuscular structure. He did not find them in several cases of leukaemia, myelocytic or lymphocytic, in the anaemia of cancer, in a case of lead poisoning and in patients with subtertian malaria, but they were present in 14 cases of pernicious anaemia (not in 4 others who were improving with treatment by liver) and in anaemic patients with benign tertian infection. *H. H S.*

MULLER (H). Histoplasmose in Oost-Java. [**Histoplasmosis in East Java.**]—*Geneesk Tijdschr. v. Nederl.-Indië.* 1932. July 5. Vol. 72. No. 14. pp. 889–895. With 4 figs. on 2 plates. [15 refs.] German summary.

The case described by the author is the first of its kind which has been diagnosed outside America. A 7-year-old Javanese boy from the interior had been ill for some time and suffered from continuous fever, abdominal cramps and vomiting. He was greatly emaciated, with enlarged hard glands in various situations but especially in the neck region. A hard movable tumour mass was palpable in the abdomen. The reactions of v. Pirquet, Wassermann and Sachs-Georgi were negative and there was no evidence of leukaemia. At death it was found that all the lymph glands, peripheral as well as internal were quite white, friable, enlarged but discrete, and could be shelled out. No caseation was evident. A handsbreadth above the ileocaecal valve was an ulcer with undermined edges. Microscopically the affected tissues showed spherical Gram-staining organisms, with an appearance as of a surrounding unstained capsule and no internal structure. They were 1 to 3 μ in size and were contained within the cytoplasm of large macrophages of undoubted reticulo-endothelial type. The diagnosis lay between kala azar and histoplasmosis. Kala azar does not occur in the Netherlands Indies nor was there any indication of the presence of the distinctive blepharoplast or kinetonucleus of *Leishmania donovani.* The positive coloration by Gram was another differential feature. In considering the nature of the organism the author refers to its affinity with the blastomycete *Cryptococcus farciminosus*, which is the causal organism of epizootic lymphangitis in horses. It could not however, be cultivated, whereas the cryptococcus is easily grown. Epizootic lymphangitis is common in Java, but on the other hand, it does not exist in America where the first cases of histoplasmosis were discovered. This case forms only the sixth of the total number hitherto described.

W. F. Harvey.

BENJAMINS (C. E.). Over Hooikoorts (Pollenosis) in Indië. [**On Hayfever (Pollenosis) in the Netherlands Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Aug. 2. Vol. 72. No. 16. pp. 1016–1027. With 13 figs.

The author intends to determine whether the so-called " rhinitis spastica tropica " is not, at least in a number of cases, actually an allergic condition like the real European hayfever. The observation in Holland of 3 patients who suffered from spastic rhinitis in the Netherlands Indies showed that they were allergic against the pollen of various tropical Graminaceous species, including rice pollen (*Oryza sativa*), as well as against those of European grass species. Further study of this subject in the tropics especially in regard to Ambrosia and Artemisia species, is needed. Anti-allergic treatment by means of pollen extracts looks more promising than the symptomatic treatment practised so far.

With pollen of various palm trees positive allergic reactions were seen in a European hayfever patient. In this patient as well as in patients from the tropics the pollen of Oreodoxa (? cabbage palm tree) caused no reaction. Yet since long in the tropics some connexion has been recognized between the flowering of this palm and the rhinitis attacks, which fact the author ascribes to the mechanical irritation of the mucous membrane by the sharp edged Oreodoxa pollen, which is shown in illustrations. *W. J. Bais.*

GIGLIOLI (George). **Paratyphoid C Case Reports from British Guiana.** —*Jl. Trop. Med. & Hyg.* 1932. Oct. 1. Vol. 35. No. 19. pp. 290–297. With 4 charts. [20 refs.] [Summary appears also in *Bulletin of Hygiene.*]

This article is largely clinical, several cases being described in detail with their respective temperature charts. The author has previously recorded cases and outbreaks in British Guiana among employees of the Demerara Bauxite Co. to which he was medical officer. He notes that infection by *Bact. paratyphosum C* is widespread and that in the tropics conditions prevail which give opportunity for, if they do not actually favour, explosive outbreaks, and it therefore calls for attention every whit as much as other enterica infections.

The ordinary T.A.B. vaccine is prophylactically powerless against it and the quadruple T.A.B.C. is necessary. This was first used in the Serbian army during the Great War. Dr. Giglioli made it and employed it extensively in Demerara ; during the period 1928–30 more than 1,100 persons were inoculated and though cases continue to occur among the non-vaccinated population, none of the inoculated has developed the disease. *H. H. S.*

CASTELLANI (Aldo). **Epidemiological Notes on Some Tropical Mycoses.** —*Proc. Roy. Soc. Med.* 1932. Sept. Vol. 25. No. 11. pp. 1605–1614 (Sect. Epidemiol. & State Med. pp. 79–88).

The author deals with tonsillomycoses and bronchomycoses, Madura foot, tinea cruris, tinea flava, tinea nigra, pinta, tinea imbricata and a few other skin conditions. Most of the information is to be found in CASTELLANI and CHALMERS' "Manual of Tropical Medicine."

A. G. B.

DO AMARAL (Zepherino). Eléphantiasis scrotal. [**Scrotal Elephantiasis.**] —*Rev. Sud-Américaine de Méd. et de Chirurg.* 1932. Mar. Vol. 3. No. 3. pp. 223–227. With 2 text figs.

In this Brazilian case microfilariae were sought on three occasions without success. The scrotal swelling was regarded as "elephantiasis nostras"; it followed an injury to the perineum. *A. G. B.*

BARNSLEY (A.). Anaesthesia in the Tropics Basal Narcosis with "Avertin."—*Malayan Med. Jl.* 1932. Mar. Vol. 7 No. 1. pp 1–12 With 4 charts. [26 refs]

BEIJNEN (G. J. W Koolemans) Diarrheeën van tropischen oorsprong.—*Nederl. Tijdschr. v. Geneesk* 1932. Sept. 3. Vol. 76. No. 36. pp. 4190–4199.

BERTI (Edoardo). Appunti di noso-geografia sulla Msellata (Tripolitania).—*Arch. Ital Sci. Med. Colon.* 1932. May 1. Vol. 13 No 5. pp 296–313. With 5 text figs. English summary (5 lines).

CASTELLANI (Aldo). Brevi cenni storici sulla medicina tropicale dai tempi antichi ai nostri giorni.—*Policlinico.* Sez. Prat. 1932. July 18 Vol. 39. No. 29. pp. 1117–1130. With 15 figs.

DEL VAL (José). Cirugia en los tropicos.—*Medicina Países Cálidos.* Madrid. 1932. Sept Vol. 5. No. 5 pp. 353–370. With 13 figs.

ELMES (B. G. T.). A Case of Abdominal Lymphosarcoma with Associated Splenomegaly.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 195–197. With 3 figs. on 1 plate.

HUISMAN (R. G. J. P.). De sympathico-diaphtherese volgens Doppler (phenolisatie der arterien) en hare toepassing bij de behandeling van ulcera cruris (tropica).—*Geneesk. Tijdschr. v Nederl.-Indië.* 1932. Oct 11. Vol. 72. No. 21 pp 1435-1439.

LACQUET (Albert M.). Experimental Pathology of the Liver. VIII. Effects of Carbon Tetrachloride on the Normal and on the Restored Liver after Partial Hepatectomy.—*Arch. Pathology.* 1932 Aug. Vol. 14. No. 2 pp. 164-176. With 6 figs. [18 refs.]

MEIKLEJOHN (A. P.), PASSMORE (R.) & PETERS (R. A.) The Independence of Vitamin B Deficiency and Inanition.—*Proc. Roy. Soc* Ser. B. 1932. Sept 1. Vol. 111. No. B 772. pp. 391–395. With 3 figs.

ROBIC (J.). Notes sur les infections à déterminations gastro-intestinales observées à Tananarive, pendant la saison chaude 1931–1932.—*Bull. Soc. Path. Exot.* 1932. July 6. Vol 25. No 7. pp. 790–795.

ROBIN (L. A.). Perfectionnement apporté à une méthode d'enrichissement des selles.—*Bull. Soc. Path. Exot.* 1932. July 6 Vol. 25. No. 7. pp. 700–702.

SERAGLIA (P) Contributo allo studio sulle condizioni sanitarie dei Baluba del Lomami —*Arch Ital Sci Med Colon* 1932 May 1 Vol 13 No 5 pp 283–295 With 11 text figs English summary (6 lines)

TESSITORE (Carlo) Note di nosografia generale della zona di Bumba (Congo Belga) — *Arch Ital Sci Med Colon* 1932 June 1 Vol 13 No 6 pp 355–366 English summary (3 lines)

TSUCHIYA (H) A Practical Staining Method for Intestinal Protozoa *Jl Lab & Clin Med* 1932 Aug Vol 17 No 11 pp 1163–1164

ZOTTNER Coloration du sang et des hématozoaires par la méthode de Stévenel modifiée —8 pp With 7 figs on 4 plates Travail du Laboratoire de Recherches du Service de l Elevage du Maroc

REVIEWS AND NOTICES

LANE (Clayton) [M D , Lond , Lt -Colonel, I M S (retd), formerly in Charge of the Darjeeling Ankylostome Inquiry, and co-opted Member of the Sanitary Board Bengal, and of its Hookworm Disease Committee] **Hookworm Infection.** pp xiv+319 With 36 figs 1932 London etc Humphrey Milford, Oxford University Press [25s]

Colonel Clayton Lane's long association with hookworm research in relation to the health of the individual and the community entitles him to write a book on the subject from the point of view of a successful specialist

While the various aspects of the subject are discussed very fully, direct diagnosis, treatment and prevention receive especially detailed consideration The author accepts the following records of animal hosts other than man for *A duodenale*, gorilla, tiger pig and the civet , for *N americanus* dog, cat rhinoceros and pig Rough geographical limits are given as 36°N and 30°S latitudes with great extension beyond these limits in special cases such as mines, where conditions of an artificial kind are favourable to extracorporeal development The conclusion that necator infections tend to predominate in the hotter and ancylostome infections in cooler climates, is rejected on the finding that at 5 000 to 7 000 feet in Darjeeling there is a pure necator infection while ancylostomes appear at lower, warmer, altitudes Many fallacious conclusions such as the above are held to have resulted from the use in experiments of untrapped cultures

With reference to extracorporeal life the evidence discussed leads to the conclusion that while eggs only survive about three months larvae in favourable conditions will live long enough to carry on infection from year to year, and may be vigorous enough to do so the author does not agree with those who hold that larvae in soil die out in six or seven weeks and who base their anti hookworm campaigns on this assumption Soil which appears quite dry has been proved to harbour larvae and in any case the author points out that it is the condition of the places used for defaecation which is of paramount importance and that these are frequently shaded and moist especially where water is used after defaecation

The author strongly advocates the use of direct centrifugal floatation and D C F F which is Direct centrifugal floatation pushed to finality " His opinion of it is frequently expressed in some such terms as the following ' The real value of certain concentrative diagnostic techniques as measured by egg counts is set out in Fig 26 the delivery of D C F F being taken as 100 It will be concluded that he has complete confidence that for accuracy and reliability his method cannot be surpassed at the present time by any method in use and the evidence which he brings forward to support these high claims certainly appears convincing

Treatment receives very full consideration and the author's conclusions are not favourable to the more modern systems of hookworm therapeutics, either as regards their safety or success Thymol, beta-naphthol oil of chenopodium, carbon tetrachloride tetrachlorethylene and hexylresorcinol and various mixtures of drugs are each discussed in a critical manner The conclusion reached will come as a surprise to those who believe that hookworm therapy has advanced with each new drug introduced On all the exact evidence which has been obtained and marshalled, *particulated* thymol is the drug of election for the individual, or for the mass, treatment of hookworm infection " , those who are not acquainted with the method described by GILES so long ago as 1890 will find it discussed here

As regards mass treatment of large populations, on the basis of positive findings which may apply to only a small percentage of the people a system referred to by the author as " herd treatment," many readers will agree with his emphatic hostility to it " I hold the system to be inexpedient, unscientific, and immoral " He rightly argues that in the long run it pays to treat the individual who requires treatment as an individual, and as a patient whose life is just as valuable to him and his friends, as it would be if he did not happen to suffer from hookworm infection.

It is not to be expected that the author will instantly succeed in convincing all those who hold opinions different from his own. There should thus be a good, if somewhat controversial, future before this book, since it is difficult to see how any serious worker can afford to be without its guidance, or to ignore its helpfully critical spirit. *B. Blacklock.*

WAKIL (A. W.) [M.B., Ch.B. (Cairo), Dip.Hyg. (Camb.), D.T.M. & H. (Camb.), etc.] **The Third Pandemic of Plague in Egypt. Historical, Statistical and Epidemiological Remarks on the First Thirty Two Years of its Prevalence.**—Egyptian University. Faculty of Medicine. Publication No. 3. 169 pp. With 27 charts. 1932. Cairo: Egyptian University.

The first chapter of this book gives a brief account of the history of epidemic plague with particular reference to Egypt. The experience of that country is, in some striking respects, similar to that of Europe. One has, in the contemporary records, the same tendency to wild exaggeration of the numbers killed, but also the same evidence of very long intermissions between pandemic periods. Thus after the epidemic of A.D. 719 no other occurred for nearly 300 years The present epidemic period began after a free interval of more than 50 years. One factor of the dwindling of plague after 1844 is suggested to have been the change in the trade routes from the east (culminating in the opening of the Suez Canal in 1869) and the contemporaneous freedom of India from epidemic plague. The next chapter is devoted to the origin of the epidemic period which began in 1899—*i.e.*, after plague had again become widespread in India. The most plausible of the theories of origin seems to be that grain sacks—presumably containing infected rats or fleas—reached Alexandria by rail from Suez. In 1899 Alexandria alone was involved The next chapter deals with the progressive dispersion of plague in the first 6 years of the epoch; the number of deaths increased from 45 in the first to 501 in the last of the six years. Chapter 4 provides statistical data for the whole period 1899–1930. The peak years have been 1907 (914 deaths), 1911 (1,041 deaths), 1916 (828 deaths), and 1923 (726 deaths). In 1930 there were 109 deaths. The author is disposed to attribute the relative mildness of the present plague cycle to an improvement of environmental and sanitary conditions rather than any biological peculiarity of the rodents which form the reservoirs and distributors of infection. Abundant data of the local distribution of plague are provided. A point of interest is that the clinical pneumonic type of plague, which in Egypt as a whole forms about 10 per cent. of the total, is much more frequent in Upper Egypt than elsewhere. A plausible explanation is that, owing to differences in the irrigation system, many of the inhabitants of Southern Egypt are forced to remain idle during March-May (the plague season). Domestic overcrowding, due to this circumstance, together with the return home of villagers who had migrated to the infected ports of Alexandria, Port Said and Suez in search of work and came home to die may be responsible.

The author next takes up the study of the distribution of different kinds of rat and their flea infestation. The next chapter discusses the special features of plague in Cairo and Alexandria. Cairo has enjoyed a remarkable immunity; in the period 1899–1930 only 16 cases of plague with 11 deaths have been recorded. One factor of this immunity seems to be biological. Since the middle of the last century weasels have bred in large numbers in the city and have no doubt helped to keep down the rat population. Alexandria on the other hand has suffered a good deal from plague. It seems probable that plague is kept alive in Alexandria amongst the local population of rats although bacteriological proof is not easy to obtain Although thousands of rats have been caught and dead rats collected, sometimes from houses in which plague in man has occurred, positive bacteriological findings have been rare

Professor Wakil has collected in this volume a great deal of information and presented it clearly It is a pity that his modesty did not allow him to round off the work with a general review of the evidence and conclusions deducible from it *M Greenwood*

THAYSEN (Th E Hess) [M D, Senior Physician, St Elisabeth's Hospital, Copenhagen] **Non-Tropical Sprue. A Study in Idiopathic Steatorrhoea.**—pp iii + 258 With 39 figs 1932 Copenhagen Levin & Munksgaard London Humphrey Milford, Oxford University Press [10s paper, 12s 6d cloth]

The author's avowed purpose is to describe the clinical picture of non-tropical sprue, to demonstrate that it is identical with sprue occurring in the tropics and to stimulate interest in the many problems still unsolved With this end in view he presents a detailed study of the clinical features and the pathological anatomy of both and discusses the diagnosis pathogenesis and treatment A work such as this makes an exceptionally wide appeal It is of interest to tropical practitioners whether abroad or at home, for it is all important for them to distinguish true sprue from sprue like diseases, particularly with the bias which all those who have practised in the tropics unwittingly have to regard anyone with steatorrhoea who has lived abroad as a case of sprue Again, it concerns the general practitioner at home, since any one of them may meet with men from the tropics who have suffered from sprue in the past and may relapse or who develop sprue after their return from abroad, or thirdly, they may meet with other conditions presenting some at least of the symptoms of sprue *e g*, pellagra (of which several cases have been recorded in England) pancreatic disease coeliac disease, though to mention the last savours of a *petitio principii*, since the author maintains that Gee-Herter's disease (GEE 1888, HERTER 1908), tropical and non tropical sprue grouped together as ' idiopathic steatorrhoea,' are closely related and possibly identical, not a triple personality but one and the same condition which if it occurs in the tropics is regarded as sprue, outside the tropics as non tropical sprue " in adults and as Gee Herter's disease in children

The author mentions all the cases he has been able to find in the literature, those reported by HOLMES and STARR, and PORTER and RUCKER (in U S A), by SCHLER (Holland), SCHAFFER, WILFERT, HEGLER (Germany) ROSENDAHL (Norway), HOLST, GEILL, JORGENSEN and WARBURG and the author himself (Denmark), GLOOR and MEYER (Switzerland) and MANSON-BAHR (England) A table of 34 is given, and in addition he discusses CHVOSTEK'S and UMBER'S cases diagnosed as functional pancreatic achylia " and SCHONEMANN'S patient with ' pluriglandular insufficiency with tetany " and fatty diarrhoea due to pancreatic lesion

Each of the symptoms is analysed in turn and its significance discussed The similarities between tropical and non-tropical sprue (including Gee-Herter's syndrome) are the fatty diarrhoea, stomatitis, emaciation and anaemia, in both the fat absorption is lowered in the bad periods, protein absorption is normal, there is a normal respiratory quotient, often increase in basal metabolism, a low blood sugar curve after ingestion of glucose, and a disturbance of mineral metabolism There are, of course, individual variations, nevertheless " it is not only the chief symptoms that are the same, but a detailed analysis of these symptoms shows a most convincing congruity between non-tropical and tropical sprue," and again later the author writes, ' In non-tropical sprue one does not meet with a single symptom that is not encountered in cases of sprue developed in the tropics and vice versa, and this correspondence of the symptomatology . . . becomes even more conspicuous as the individual symptoms are analysed more thoroughly."

To speak in a little more detail of a few special points: It would seem to the reviewer that rather too much stress is laid on a history of a previous acute or chronic intestinal disturbance This can be of little value ; it is probably equally common in those who do not develop sprue-like symptoms later, it certainly is so abroad Again, too much is made of the age factor, especially if the thesis is sustained that the coeliac affection in children and adults and non-tropical and tropical sprue are one and the same

Dr Thaysen's view of the anaemia is very sound and judicial He remarks on the tendency to a shifting back and forth between hypo- and hyper-chromatic types, hence the classification of these anaemias is somewhat arbitrary and if the patient be observed for a sufficient length of time either type may be found The chemical findings of the blood—urea, uric acid, creatinin, non-protein nitrogen, cholesterol—were found by him to be the same in non-tropical as has been recorded by MACKIE, FAIRLEY, ASHFORD and SERRA in tropical sprue

As regards the pancreas he quotes BEGG and CAMMIDGE to the effect that " chronic pancreatitis is a frequent complication of tropical sprue " but since autopsy usually reveals a normal gland or very slight changes " these are to be taken as secondary phenomena " both in non-tropical as well as tropical sprue With this probably all investigators now agree and analyses of the fats in the stools and the ratio between the neutral fats and fatty acids also bear this out

The author's discussion on the endocrine glands in relation to the symptoms of sprue is good and very fair He gives priority of place to the parathyroids and states ' FALTA assumes that there is a certain interaction between the parathyroids and the thyroid " When discussing SCOTT's theory of parathyroid action in regulation of the serum calcium changes in tropical sprue he does not mention [perhaps he was not aware of it] a fact strongly in favour of this interaction, viz, that when he (SCOTT) was carrying out experiments on his own case he was able during the stage of recovery to reproduce the symptoms at will by stopping parathyroid and substituting for 3 days or so thyroid extract He was able to verify it in another patient also It was not part of this theory that a " decrease of serum calcium is characteristic of sprue " (p 89), but that in cases of average severity, and in early or recovering cases, the total was about normal [this is stated in a footnote later, p 177] and that the fault was a mal-regulation of it due to functional parathyroid inadequacy In these 34 cases of non tropical sprue 11 showed symptoms attributable to some endocrine hypo- or dys-function Tetany was present in 9, twice complicated with goitre [Perhaps the latter was cystic and therefore of deficient not excessive action] That ' calcium absorption is lowered in certain cases is evident from the presence of osteoporosis [illustrative of this is a beautiful plate] and from the low calcium content in the blood in cases without tetany," but " calcium elimination in the faeces is increased " states the author, may not both, however, be due to increased calcium abstraction ?

In the section dealing with aetiology, three main theories are discussed Infection, Avitaminosis and the Constitution Theory Dr Thaysen concludes that the first is the least tenable, though it may help to explain the rarity or absence of sprue in some tropical countries, *e g*, Africa, Jamaica, and its frequency in others, as India, Ceylon, China, Porto Rico As regards the second, the evidence is at present conflicting The third is adduced to explain the rarity of sprue in natives [but recent accounts show that it is probably not so rare as has been believed], at all events the term is too vague to have a tangible meaning

The presentment and argument of the theories of pathogenesis are put with all fairness, the question of steatorrhoea naturally is dealt with in greater detail, whether it arises from defective splitting of fats in the intestine, rapid evacuation, defective absorption or abnormal excretion from the bowel In this connexion the fat content of the blood is a matter calling for more thorough investigation

Morbid anatomy and histology are largely negative, there is the same lack of characteristic changes in the intestine in non-tropical as in tropical sprue A series of microphotographs of the intestine is reproduced, but such, even under the best conditions, are very inadequate for showing the finer morphological changes

There is little calling for comment in the chapter on diagnosis In chronic pancreatogenous fatty diarrhoea the elimination of nitrogen is almost constantly increased, seldom in sprue, chemical analysis of the faeces also will reveal the difference Hyperchromatic anaemia together with fatty diarrhoea is strongly suggestive of sprue Steatorrhoea occurs in tuberculosis of the mesenteric glands, gastro-jejuno-colic fistula causes fatty diarrhoea, emaciation and anaemia [see this *Bulletin* 1932, vol 29, p 463], the distinction from pernicious anaemia has repeatedly been pointed out Pellagra, if skin lesions are inconspicuous and intestinal symptoms and glossitis are prominent, may constitute a difficulty, but fat absorption in pellagra is usually normal, the anaemia is not of the hyperchromatic type, and we usually have the history of seasonal relapse There is a good table of the chief diagnostic points between pancreatogenous fatty diarrhoea, mesenteric tuberculous adenitis and non-tropical sprue

The vexed question of treatment is summarized with judicial restraint with the exception of diet it is largely symptomatic as is but natural, where the cause is obscure Calcium checks the diarrhoea and renders the stools less acid hydrochloric acid is serviceable if there is achylia for hypochromatic anaemia iron for hyperchromatic liver vitamin B (marmite) The author is of opinion that the influence of diet has been over estimated because success has followed any of at least five modes 1 Milk and no meat (MANSON LOW), 2 Meat and no milk (CANTLIE ELDERS) 3 Pure carbohydrate (COLLIN), 4 High protein, low fat and carbohydrate (FAIRLEY) 5 Pure fruit (v d BURG)

In conclusion, we have in this book a very difficult problem most ably argued Under present circumstances the utmost that anyone can do is to marshal fairly the evidence for and against and let those with experience draw their own conclusions Certain small points of distinction exist between cases of tropical and those of non-tropical sprue, but whether these are sufficiently marked to warrant separation into two entities is doubtful there is much greater difference between, say, Oroya fever and verruga peruviana All those working at this much debated question will be grateful to the author, who throughout this book has given full credit and prominence to British investigators a courtesy which is by no means general among continental writers *H H S*

BLACKLOCK (D B) [M D , Professor of Parasitology, Liverpool School of Tropical Medicine, University of Liverpool] **An Empire Problem: the House and Village in the Tropics.**—100 pp 1932 The University Press of Liverpool London Hodder & Stoughton Ltd [3s 6d.] [Review appears also in *Bulletin of Hygiene*]

The prosperity of trade between Great Britain and the overseas dependencies of the Empire is closely connected with the health of the natives who inhabit those dependencies, and produce the raw materials needed in the home country The progress of scientific research has thrown a flood of light upon those diseases which render life in the tropics precarious, and are responsible for such a heavy mortality and morbidity amongst the native races These are in the main preventable diseases, and science has placed in our hands specific remedies for their cure or prevention Professor Blacklock, within the compass of a hundred brief pages, gives a masterly survey of the principal diseases which make his tropical home so dangerous to the native, and his environment so uncomfortable. The book is written for non-medical readers in simple language, and is primarily intended to catch the eye of the larger trading companies, who in their business relations come into close contact with the natives with whom they trade. However valuable the discoveries placed in our hands by medical and scientific research, they are useless unless they can be practically applied to the needs of the native inhabitant. This is the "empire problem" of which the book speaks. Its solution depends on the co-operation between Government and the agents of commerce.

Professor Blacklock, in an extremely interesting way, classifies the dangers which threaten life, health, and economic efficiency in the tropics under three main heads: (1) diseases connected with the houses, (2) those associated with the village water supplies, and (3) those arising out of the existing imperfect methods of disposal of human excreta. Under the first category the potential dangers of dirty and cracked floors in harbouring fleas, flies, ticks, and bugs are explained in terms of the diseases they bring; then the roof with its rats and mosquitoes, and the diseases introduced by them; and finally the ravages caused by termites in the wooden supports of the native hut. In the second category the water-borne diseases, cholera, typhoid, bacillary and amoebic dysentery, ankylostomiasis, bilharzia, and the guineaworm are reviewed, and the life-history of their causal organisms sufficiently described to show the line that preventive measures should take. Other diseases, indirectly dependent on uncontaminated water, are reviewed—such as malaria, elephantiasis, yellow fever, and sleeping sickness. Finally the importance of providing suitable latrines is emphasized, and the principles of hygienic and simple latrines of the bore hole and large pit types are explained. The whole message of the book is summed up in a clear recapitulation chapter, dealing with practical measures by which commerce can co-operate with Government in vastly improving the health and trading capacity of the native.

The book would be improved by a few illustrations, but it would be hard to imagine any material improvement in the way the subject matter is treated. Some of the descriptions, such as the ravages of rats, and their ingenuity of adaptation, the destructive power of termites, the helplessness of the naked child to escape myriads of disease-producing bites from scores of enemies, and the misery of unlighted villages are so graphic as to be unforgettable.

The measures outlined in this book will go a long way towards solving the empire problem, but one ventures to think that it will never be completely solved along these lines. The total number of white men is so infinitesimal in comparison with the native population of Africa, that Africa can only really be reformed by Africans. Ultimately the solution must be found by training African doctors, sanitary inspectors, welfare workers, nurses and the like, and stationing them at strategic centres to teach the rural population. Lastly, every white immigrant in the country, Government agent, missionary, trader and settler alike, should have a course of elementary medical and hygienic training sufficient to enable him to be an apostle of hygiene. *J. Howard Cook.*

ORIEL (G. H.) [M.D. (Cantab.)]. **Allergy.** With Foreword by H. W. BARBER M.B., B.Ch. (Cantab.), F.R.C.P.—pp. ix + 78. Pocket-Monographs on Practical Medicine. 1932. London: Bale, Sons & Danielsson, Ltd. [2s. 6d.]

This book is reviewed in *Bulletin of Hygiene*, 1932, Vol. 7, p. 600.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 30.] 1933. [No. 2.

MALARIA.

UNITED FRUIT COMPANY, BOSTON, MASS. TWENTIETH ANNUAL REPORT. MEDICAL DEPARTMENT. 1931. Section I. pp. 17–33, and Section II. pp. 34–111.—[**Papers on Malaria.**]

i. **Comments on some of the More Important Diseases occurring in the Tropical Divisions.** [CONNOR (R. C.)] pp. 3–33. [Malaria, pp. 17–33.]

Dr. R. C. Connor, the General Manager of the Company's medical department, reports that malaria is the most prevalent disease in the estates. By strenuous efforts its incidence can be reduced to proportions which do not materially handicap the community, but eradication seems impossible. The results of antimalarial measures have been "somewhat gratifying," but fall very short of what was hoped for. Control measures are greatly handicapped by the obstructive attitude of the natives, who refuse to take drugs unless they are actually suffering from symptoms of malaria. The principal antimalaria measures adopted are :—(*a*) Careful selection of sites, and clearing for a radius of 200 yards around dwellings; (*b*) Removal, or Paris green treatment, of breeding places; (*c*) Periodical surveys and treatment of infected persons with one plasmoquine tablet and 10 grains of quinine twice a day for six days ; when the infection rate in a camp exceeds 25 per cent., the whole population is subjected to treatment. The screening of quarters and the use of mosquito nets are generally speaking impracticable on the Company's plantations.

Several of the medical officers were supplied with atebrin for experimental purposes. A total of 320 cases was treated. The usual course was a single dose of 0·3 gram daily for five days ; larger doses over longer periods were given in some instances without producing any symptoms beyond a yellow staining of the skin, and that in only a few cases. Photosensibility did not occur. Drs. CORDES and DE LA TORRE of Preston, Cuba, in reporting the results of treating 121 cases, stated that they had never seen more than two paroxysms occur after the initiation of atebrin treatment ; all the patients made an uneventful recovery. Drs. NEUMANN and LE DOUX, of the Company's hospital at Santa Marta, Colombia, reported concerning atebrin that "the treatment of 75 cases of aestivo-autumnal and tertian malaria has given us the rather spectacular result of curing all the patients within one week or less." They detected atebrin in the urine as long as 36 days after the last dose, and concluded that its slow elimination rendered it suitable for prophylaxis. Very few relapses were observed after atebrin treatment, but local conditions made it impossible to follow up many of the patients.

Drs. PHELPS and JANTZEN, of the hospital of Puerto Castilla, Honduras, treated 14 cases of blackwater with atebrin, and in no instance did it provoke another attack.

ii. **Observations on the Diagnosis and Treatment of Malaria.** [JAMES (Wm. M.)] pp. 34–41.

Dr. W. M. James contributed a paper on the value of the thick film method, and claimed that by it 30 per cent. more films are found positive than when thin films are employed. The films should be dried at room temperature and stained in Giemsa solution for 15 or 60 minutes according to the strength of the stain (see GREEN, this *Bulletin*, Vol. 29, p. 718).* Dr. James could always find parasites by this method when the patient's temperature was over 100°, if the fever was due to malaria. It is one of the most reliable tests in medicine because, " if in competent hands it is negative on two occasions twelve hours apart, then the condition is certainly not acute malaria." In the author's experience, subtertian cases are invariably fatal when more than 15 per cent. of the cells contain parasites : between 5 and 10 per cent. the outlook is serious. He believes that in malaria it is important to attack early with plenty of quinine.

iii. **Anopheles Mosquito Control.** [HALE (Carleton).] pp. 98–107.

Mr. Carleton Hale, the Company's General Sanitary Inspector, stated that with mechanical dusters there is an enormous saving of Paris green and labourers' wages, as compared with hand-dusting. A 3 per cent. mixture (by volume) is used in the dusters, and lime, limestone or soapstone are employed as diluents.

[References to 10 other papers on malaria contained in this Report are given in the list of Titles of Unnoticed Papers on pp. 92–6.]

W. Fletcher.

PEREPEREZ, LARA (Gutierrez), BOTE, ZOZAYA, CARTAÑÁ, TORRADEMÉ & COLLADO (Gil) sous la direction de G. PITTALUGA. Le paludisme dans les "deltas." (Etudes sur certaines conditions naturelles et expérimentales de l'anophélisme dans le delta de l'Ebre, 1926–1930.) [**Malaria in Deltas. Treatment of Malaria.**] —*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1932. Mar. Vol. 5. No. 1. pp. 5–131. With 5 plates, 1 chart, 16 graphs & 29 figs. [21 refs.]

ZOTTA (G.). Etudes sur le paludisme dans le delta du Danube. (I : Anophélisme sans paludisme.)—*Ibid.* pp. 133–176. With 1 map.

CIUCA (M.), BALTÉANU (J.), BAILLIF (L.), IRIMESCO (G.), ALEXA (E.), CONSTANTINESCO (N.), JANCOU (J), AGAPI (C.) & VIERU (M.). Contribution à l'étude du traitement du paludisme.—*Ibid.* pp. 177–208. With 10 charts. [11 refs.]

SLATINEANU (Al.), BALTEANU (I.) & ALEXA (I.). Recherches comparatives sur l'action thérapeutique de la quinoplasmine, du quiniostovarsol et de la quinine sulfurique dans le paludisme spontané.—*Ibid.* pp. 209–237.

The Malaria Commission of the League of Nations has recommended for special study the problem of malaria in the deltas of great rivers.

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*In the summary of GREEN's paper on p. 719, line 8, *for* " to three drops of (b) " *read* " to three cc of (b) "

In this volume, Professor Pittaluga describes the conditions in the delta of the Ebro, and Dr. G. Zotta describes those in the delta of the Danube. The only Anopheles found at the mouth of the Ebro are the two races of *A. maculipennis*: the long-winged *A. maculipennis maculipennis*, and the short-winged *A. maculipennis atroparvus*; of these, the first-named is much the more abundant. Moreover, anopheles are more plentiful in stables and pig-styes than in human habitations. Among a large number examined 83 per cent. contained animals' blood, 9 per cent. avian blood, and only 6 per cent. human blood. The distribution, numbers, and food preferences of anopheles were studied by means of six experimental huts built at chosen spots and baited with various animals or birds. One interesting point which emerged was the great attraction of warm-blooded animals for anophelines; even in places where birds were abundant and animals very scarce, 80 per cent. of the anophelines contained animal blood: very few female anopheles were caught in huts baited with poultry. It was found that there was dissociation between the resting places of anopheles and their sources of food at certain times of the year. Female anopheles take shelter far from their food-supply during the period of dispersion in the summer, but when hibernation approaches they shelter near their food. Years ago, the delta was poor, little cultivated and almost uninhabited. There was much malaria then, but during the last 25 years the fertile land has been exploited, and there are now 14,000 hectares of rice-fields and market gardens; although the rice-fields breed myriads of anopheles, the position is entirely changed, and in 1930 the spleen rate was only 8.

Dr. Zotta describes conditions in the delta of the Danube, which affords another example of anophelism without malaria. The anopheles feed on beasts and birds rather than on man, and at times this propensity becomes a veritable misanthropy. There are sporadic cases of malaria, but though there is an abundance of anopheles which are potential carriers the disease never spreads.

Dr. Ciuca and his colleagues contribute a study on the comparative values of quinine bihydrochloride, cinchonine hydrochloride and sulphate, an Amsterdam sample of quinetum (containing 20 per cent of amorphous alkaloids and 35 per cent. of cinchonidine), and two samples of cinchona febrifuge differing widely in composition. They found that the quinetum was as efficacious as quinine, but that the cinchonine salts and the febrifuge were inferior.

Dr. Slatineanu and his colleagues report on the therapeutic action of quinine, quiniostovarsol, and quinoplasmine. There was little difference between these drugs as regards action on schizonts; but quinoplasmine destroyed gametocytes. Relapses were 37 per cent. with quinine, 24 per cent. with quiniostovarsol, and 10 per cent. with quinoplasmine.

W. F.

RECORDS OF THE MALARIA SURVEY OF INDIA. Calcutta. 1932. June. Vol. 3. No. 1. pp. 1–173. With numerous illustrations.

i. **Malaria in Calcutta.** [COVELL (G.)]. pp. 1–82. With 1 graph, 3 maps, 1 chart & 5 figs. [58 refs.]

Major G. Covell contributes an interesting paper on malaria in Calcutta. It is not, to-day, the serious menace to health which it was many years ago. *A. stephensi* is the transmitting agent in the central parts of the city. The water supply from the Hoogly is intermittent, and this necessitates the use of an enormous number of cisterns and receptacles in which *A. stephensi* breeds. The water-carriage system has greatly increased the number of breeding places in recent years. Breeding places of *A. ludlowii* have been found at various points within 12 to 30 miles of Calcutta, and there is evidence that this species has been recently introduced into these localities by country boats. There is danger that *A. ludlowii* may gain a footing in the Salt Lakes to the east of the city. These were formerly tidal and thus unsuitable for breeding, but they have become non-tidal in recent years owing to river silting, and any scheme designed to restore tidal influence should be regarded as an important anti-malarial measure. (See IYENGAR, this *Bulletin*, Vol. 29, p. 334.)

ii. **Malaria in Patiala State.** [COVELL (G.).] pp. 83–101. With 2 maps.

Major Covell also gives an account of a survey of some towns and villages in Patiala State. *A. culicifacies* is considered to be the carrier in the plains, and *A. listoni* in the foot-hills where malaria is most severe.

iii. **Malaria in Sind. Part VIII. Malaria in Shahbandar Division, Karachi District, Sind.** [COVELL (G.) & BAILY (J. D.).] pp. 103–124. With 1 map.

Major Covell and Subadar J. D. Baily record the results of a survey, made during two weeks in September 1931, in the Shahbandar division of Sind, which forms part of the delta of the Indus. The northern part is fertile rice country, but the southern part is barren and consists of sand hills, mangrove swamps and salt waste. As a whole it is highly malarious, The chief carrier is *A. culicifacies* which breeds in irrigation canals, borrow-pits, and collections of water drained off from rice fields. The large lakes are comparatively harmless.

iv. **River-Sand Silting and Other Antimalarial Measures in South Sylhet, Assam.** [STRICKLAND (C.) & MURPHY (R. A.).] pp. 125–142. With 5 plates, 4 figs. & 2 maps.

Professor C. Strickland and Dr. R. A. Murphy describe the successful control of malaria on several estates in South Sylhet, Assam, by the reduction of mosquito breeding. In some places this was accomplished by diverting silt-laden hill-streams into swamps, thus filling them up and converting them into productive agricultural land. In other places, swamps were drained by ditches protected by a covering of vegetation, and contour drains were made along the slopes.

v. **Some Findings in a Malaria Survey carried out on a Group of Tea Estates in the Sibsagar District of Assam from August 1, 1930, to July 31, 1931.** [MANSON (D.) & RAMSAY (G. C.).] pp. 143–160. With 1 map and 2 graphs.

A survey of a group of tea estates in the Sibsagar district of Assam, from August 1930 to July 1931 was made by Dr. D. Manson and Dr. G. C. Ramsay, under the auspices of the Ross Institute. *A. minimus* was the only mosquito found to be infected. Silt prevents its breeding. In places where the water remains clear during the malaria transmission season much man-made malaria has resulted from blocking the natural drainage with bridges, culverts and the like. Clearing dense shade from streams has also favoured the breeding of *A. minimus*.

This species breeds in fairly clear water, slowly running or stagnant, exposed to sunlight or under partial shade. Perennial rivers and streams are endemic breeding grounds except when they become silt-laden during the monsoon. Other breeding places are rice fields lying fallow, drinking-water reservoirs, and drains carrying clear water. [See also RAMSAY and SAVAGE, p. 88.]

vi. **Confirmation of *A. philippinensis* as a Malaria Carrier in Bengal.** [BOSE (K.).] pp. 161–162.

Mr. K. Bose, Honorary Secretary of the Birnagar Palli Mandali contributes a paper confirming the finding by Dr. P. SUR that *A. philippinensis* is a carrier in Bengal.

vii. **Some Experiments to determine the Efficacy of Wire Gauze Screens of Different Apertures in excluding Anopheline Mosquitoes in India.** [MULLIGAN (H. W.) & MAJID (Abdul).] pp. 163–169. With 1 fig.

Captain H. W. Mulligan and Jemadar Abdul Majid conclude that an aperture of 0·055 inch square in gauze screens is sufficient to exclude *A. culicifacies*, *A. listoni* and *C. fatigans*.

viii. **Ultraviolet Absorption Spectra Studies in Malarial Sera.** [KEHAR (N. D.).] pp. 171–173. With 4 figs. on 2 plates.

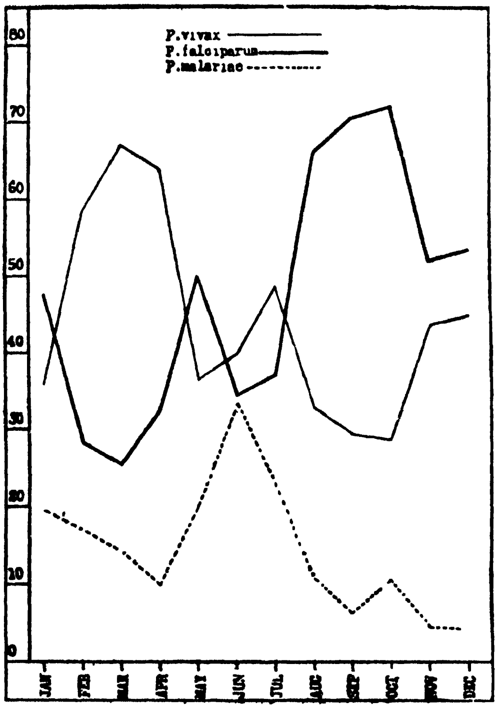
Mr. N. D. Kehar has studied the ultraviolet absorption spectra of normal and malarial sera. He found that whereas no new bands were developed in malarial sera, there was a general dimming of the spectra, and the results suggest that though no new constituents can be detected in the ultraviolet region, there is evidence of quantitative changes. *W. F*

WHITE (R. Senior) & NEWMAN (C. D.). **Studies in Malaria as it affects Indian Railways. Part II.**—*Technical Paper No. 258.—Part 2.* 71 pp. Calcutta: Central Publication Branch. [As. 14 or 1s. 6d.]

The first part of this study is a translation of a lecture delivered at the "Advanced School of Malariology" in Rome by Dr. FILIPPINI, Chief Health Officer of the Italian State Railways; the second part sets out the views of the authors as to the applicability of Italian methods of malaria control to the conditions on Indian Railways. In Italy, the malaria zones are mapped out under a Royal decree, and thus the malarial status of the different parts of the lines is known. Each employee has a malaria sheet on which are noted particulars of the malarial attacks of himself and his family, places of residence, etc. The delimitations of the malaria zone and the malaria census of employees is considered by Dr. FILIPPINI as the first requisite for a rational prophylaxis. In India, there is not the necessary staff for this. Screening with wire gauze has now been applied to all buildings on Italian railways in the malaria zone, but on the Indian railways it is virtually non-existent. Quinine is supplied free of charge to the employees of Italian railways, and is issued for prophylaxis on a large scale. The authors are not in favour of prophylactic quinine in India, but they consider the treatment of the sick is one of the most important means of prevention. "Adequate quininization is a *sine qua non*, . . . something more palatable than quinine in solution must be provided . . . this means quinine in tablet or cachet form . . . for children, one of the tasteless salts in a chocolate coating." As regards antilarval measures, the authors consider them more suited to the tropics of Asia than to other parts of the world. The carrier anophelines of India have a very restricted range of flight in comparison with those of Europe, and " the gradual realization of this fact, and its final admission in their report, was one of the most interesting things to watch during the recent tour of the Malaria Commission of the League of Nations." Although the range of Indian anophelines is comparatively small, antilarval measures limited to railway land alone would be insufficient, and, in the absence of screening and effective treatment, would not give such good results as in Italy. *W. F.*

IYENGAR (M. O. T.). **Seasonal Incidence of Tertian, Subtertian and Quartan Infections.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1 pp. 303–326. With 8 charts.

The author examined 1,876 positive films, during sixteen months commencing June 1930. The patients were people attending a treatment centre at Singur in the Hoogly District. The three species of parasites occurred in the following proportions :—*P. vivax* 41·8 per cent., *P. falciparum* 50·3 per cent., *P. malariae* 14·4 per cent. The seasonal incidence was as follows :—*P. vivax* highest in March and April, and



Comparison of the seasonal incidence of the three forms of malaria in an intensely endemic area in Bengal. Subtertian infections are high from August to October, and tertian infections from February to April. Quartan infections are highest from May to July, but their incidence is small compared with the other two types of infection.

[Reproduced from the *Indian Journal of Medical Research.*]

ranging from 29 to 67 per cent of the total infections, 49 per cent of the patients carried gametocytes *P falciparum* highest in September and October, ranging from 25 to 72 per cent of total, 41 per cent. carried gametocytes *P malariae* highest in June, ranging from 4 to 33 per cent of total, 64 per cent carried gametocytes W F

JAFAR (M) **Malaria in Mingaladon Cantonment, Burma.**—*Indian Med Gaz* 1932 Sept Vol 67 No 9 pp 493–498 With 1 map & 2 graphs

Mingaladon is situated 12 miles north of Rangoon It was cleared of jungle, and troops moved into it in 1928 It was regarded as malaria-free, like Rangoon, but in 1930 there were a few cases, and in 1931 there were 37 fresh infections and 109 relapses Suspicion fell on *A hyrcanus*, and the author found two specimens infected out of 95 examined W F

ANDERSON (Drysdale) **Notes on Mosquito-borne Diseases in Southern Nigeria: III. Differences in the Periodicity of Various Mosquitoes.**—*Jl Trop Med & Hyg* 1932 Oct 15 Vol 35 No 20 pp 305–308 With 7 graphs

The author's conclusions are as follows —The periodicities of the breeding intensities of *A costalis*, *A funestus*, *A hargravesi* and *A nili*, all of which mosquitoes occur in Abeokuta, differ among themselves The curves of *A costalis* and *A nili* can be explained on what is known of their breeding habits These are not enough to explain the curves of *A funestus* or of *A hargravesi* which are influenced by some conditions at present not known W F

GIBBINS (E G) **Natural Malaria Infection of House-frequenting** *Anopheles* **Mosquitoes in Uganda.**—*Ann Trop Med & Parasit* 1932 Oct 29 Vol 26 No 3 pp 239–266 With 6 figs

Only two of the six species of Anopheles incriminated as vectors of malaria in Uganda were encountered in more than one region, these two were *A costalis* and *A funestus* *A costalis* is the most dangerous, and at Kampala, 18 6 per cent showed infection, 6,836 stomachs and 6,486 salivary glands were examined At Jinja, the infection rate was 17 8, and at Mbale 24 2 The distribution of this mosquito is governed principally by temperature, it is common about the warm sunny towns at 4,000 feet, and when temperature is favourable its prevalence depends on rainfall *A funestus* is the most abundant malaria carrier in Uganda The infection rate at Kampala was 14 8 per cent, 5,853 stomachs and 5,665 glands were examined *A marshalli* was found in the high country surrounding Fort Portal (5,000 feet), where *A costalis* is seldom found in the wet season, and 0 3 per cent were infected *A theileri* and *A moucheti* were found to be important vectors of limited distribution *A theileri* in one district near Kampala, and *A moucheti* on the river near Jinja *A pharoensis* occurred only on the lake shore near Jinja, where 5·9 per cent were infected *A mauritianus* and *A transvaalensis* frequent native dwellings in which goats are kept, none were found infected W F

BARTOLUCCI (Filiberto). La malaria in Somalia. [**Malaria in Somaliland.**]—*Arch. Ital. Sci. Med. Colon* 1932. Oct. 1. Vol. 13. No. 10. pp. 630–632. English summary (3 lines).

This short paper consists of general statements on the prevalence and character of malaria in Somalia ; actual figures are not given, beyond the somewhat vague statement, " according to recent statistics malaria affects about 15 per cent. of the population " It is widespread generally throughout the interior, the coastal regions with the exception of Juba being practically free. The regions of highest incidence are along the rivers Uebi Scebeli and Juba, where it is particularly prevalent at the times of flood and rains. The commonest species of anopheles are *A. quadrimaculatus* and *A. costalis* which together constitute 38 per cent. of anophelines ; others less frequently encountered are *A. funestus* and *A. barbirostris*. *P. falciparum* and *P. vivax* predominate, the quartan parasite is rare. Clinically, the chronic form is most common, with splenomegaly but often without fever.

H. H. S.

SERGENT (Etienne). Epidémies de paludisme en Algérie. [**Epidemics of Malaria in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. Mar. Vol. 10. No. 1. pp. 22–33. With 13 figs.

The author concludes, from observation of the epidemiology of malaria in Algeria over a period of 29 years, that the principal cause of the epidemics is excessive rainfall—not so much the total quantity, as the extent of surface water which remains at the beginning of the summer. The annual variations of malaria are not entirely dependent upon meteorological conditions, but are influenced by other factors at present unknown. The great epidemics recur at intervals of about 12 years. *W. F.*

FEDERATED MALAY STATES. **Annual Report of the Malaria Advisory Board for the Year 1931** [WILSON (Christopher J.), Chairman]. —21 pp. 1932. Kuala Lumpur : Govt. Press.

The question of periodic suspension of anti-malaria oiling on estates was discussed, and it was stated that though in certain selected cases, the practice was justified, it was nevertheless highly injudicious to suggest in general terms to the public, or to inexperienced medical officers, that any relaxation in anti-malarial measures was permissible.

The results of a model drainage scheme carried out under government supervision on a rubber estate were considered. The annual cost of maintenance was £4' 13s. an acre, and the anti-malaria Engineer stated that skilled supervision was absolutely necessary for the success of subsoil drainage systems. The Chief Health Officer pointed out that as much as 10 per cent. of an estate had to be kept clear of trees, in order that their roots should not destroy the sub-soil drains ; he had considerable doubts whether sub-soil drainage was suited to agricultural areas. *W. F.*

ANIGSTEIN (Ludwik). **Malaria and Anophelines in Siam. Report on a Study Tour.**—*Quart. Bull. Health Organisation, League of Nations.* Geneva. 1932. June. Vol. 1. No. 2. pp. 233–308. With 18 figs. & 1 map on 10 plates. [17 refs.]

Siam may be divided into three parts as regards the incidence of malaria—(1) Central Siam consists of a huge plain extending from the head of the Gulf of Siam to a length of 350 kilometres and a breadth of 150. It is one of the richest rice-fields in the world. There is very little malaria either in this alluvial plain, or in the delta where Bangkok is situated. There is little mosquito breeding in the large straight irrigation canals, because the water is changed periodically by the tide and carries too much silt ; but there is much breeding in those parts of the irrigation system which are cut off from the source of the supply, and where the water is stagnant. There are vast numbers of culex, stegomyia and mansonioides, and also of such anophelines as *A. barbirostris*, *A. hyrcanus* and *A. vagus* ; but, apart from a few *A. fuliginosus* and *A. aconitus*, malaria carriers are absent. (2) This zone consists of ranges of hills which bound the fertile plain, except on the north-east where it is separated from French Indo-China by the Mekong River. The inhabitants of the hill country live by cultivating rice among the foothills, but it is difficult for them to grow enough to support themselves. Malaria is prevalent and severe. The finding of *A. listoni*, *A. culicifacies* and *A. minimus* in association with hyperendemic malaria makes it probable that they are the carriers. They are found in clear slowly-flowing streams and in the irrigation channels of the terraced paddy-fields when these form short branches of clear streams. *A. maculatus* is found occasionally. It is recommended that the alluvial valleys between the hill-ranges should be irrigated in order to permit rice-cultivation there, instead of in the foot-hills. The irrigation streams would become silty, thus preventing the breeding of dangerous anopheles, and the economic condition of the people would be improved. Malaria parasites were found in the blood of 108 children in the following proportions : *P. malariae* 40·8 per cent., *P. falciparum* 34·5 per cent., *P. vivax* 27·7 per cent. (3) In the south, there is a long narrow strip of country connecting the widest part of Siam with the Malayan peninsula. The eastern shore of this strip faces the Gulf of Siam, the western shore faces the Indian Ocean ; down the centre, runs a range of mountains. Malaria in the central hilly region is severe, and occurs in association with stream-breeding *A. listoni* and *A. minimus*. There is a moderate amount of malaria along the shore, probably due to *A. ludlowii*. There is also some malaria in the cultivated areas further inland, associated with *A. aconitus* and sometimes with *A. culicifacies*. *W. F.*

FENG (Lan-Chou). **Investigations on Malaria and its Transmission in Amoy, Fukien Province, South China.**—*Jl. Trop. Med. & Hyg.* 1932. July 1 & 15: Vol. 35. Nos. 13 & 14. pp. 198–202 ; 214–221. With 3 figs., 1 plate, 1 map & 1 chart. [31 refs.]

Malaria frequently causes much sickness among the rural population. There are two rainy months, April and August ; the malaria curve goes up with the rains, reaches its maximum a month later, and then declines. The disease is very prevalent near the hills, less so in the villages more distant from them, and rare in the town of Amoy. This survey was made in July-August, and at that season *A. minimus* was the commonest anopheline. It was found responsible for an epidemic of malaria among a group of imported labourers working near the foothills ; 29·85 per cent. of the mosquitoes showed oöcyst infection, and 8·57 per cent. showed gland infection. In the villages, oöcyst infection was present in only 4 per cent. *A. hyrcanus* var. *sinensis* may also be a carrier at other seasons. *A. maculatus* is considered an important carrier in Hong Kong on epidemiological grounds, but no infected specimens have been found in any part of China, the author caught no adults in Amoy but bred one specimen from a larva

The author's method of examining salivary glands is to transfer them to a drop of salt solution on a slide, remove almost all the saline with a pointed piece of filter paper, make a smear about half a centimetre wide with a little piece of cover-glass, examine almost dry without a cover-glass, the sporozoites appear as slightly-curved, refractile rods Such smears stain well with Romanowsky stains

W F

SOERONO (M), LALLEMANT (G F M Avé) & SOESILO (R) De stand van de malaria in de Tjiheavlakte **[The State of Malaria in the Tjiheavlakte District, Java.]**—*Meded Dienst d Volksgezondheid in Nederl-Indie* 1932 Vol 21 No 2 pp 21–27 English summary

In the years 1891–1904, the Government irrigated 13,600 acres for rice cultivation, at a cost of five million guilders The results were satisfactory at first, but owing to insufficient drainage the soil became water-logged, as a result of this the crops were poor and malaria was prevalent owing to the breeding of *A aconitus* in the irrigation water MANGKOEWINTO recommended that the rice-fields should be allowed to run dry after the harvest, and that only one crop should be grown in a year The execution of this plan has been followed by great improvement *W F*

DE BUCK (A), SCHOUTE (E) & SWELLENGREBEL (N H) **Further Investigations on the Racial Differentiation of** *Anopheles maculipennis* **in the Netherlands and its Bearing on Malaria.**—*Riv di Malariologia* 1932 Mar-Apr Vol 11 No 2 pp 137–156 With 2 charts & 7 figs on 1 plate

The original differentiation into long-winged paucidentate, and short-winged multidentate races is useful as a means of rapid orientation in an unexplored area, but it allows of nothing beyond a statistical differentiation, the size, especially, is dependent on the food of the larvae In order to breed mosquitoes as large as they are found in nature, single larvae must be reared in separate small jars, and fed on dried, powdered Daphnia, unicellular algae and piscidine There are other morphological differences which are of great value, because they are unmodified by the usual methods of laboratory breeding (1) In full-grown larvae, the average number of branches which the antepalmate hairs possessed between them on the same side of the 4th and 5th segments was in shortwings 5 9, and in longwings 9·3 (2) Ventral claspette spines with rounded tips were found in 0 3 per cent of male shortwings, but in 40 per cent of longwings (3) The film spreading between the ribs supporting the egg-floats (intercostal film) is smooth in shortwings, but shows a network of minute crossbars in longwings

Biological characters are even more important in distinguishing the two races (*a*) the longwings will not copulate in captivity, but the shortwings do (*b*) During hibernation, it is difficult to induce longwings to feed, and if they are persuaded to do so, the blood forms a contracted clot at the lower end of the stomach, with a clear transparent upper end, and the insect will not feed again. The shortwings feed readily, the blood does not clot firmly at one end of the stomach but fills the whole of it and is quickly digested so that the mosquito is soon ready for a second feed. [Excellent photographs are given, illustrating these conditions.] (*c*) The clotting of the blood in the longwings makes them more difficult to infect because the oökinetes cannot reach the stomach wall. In one experiment, the salivary infection of longwings was 27 per cent. as compared with 68 in shortwings. In another experiment, the average number of zygotes in the stomach of longwings was only 11, as compared with 70 in shortwings. In the spring and summer, it is as easy to infect one race as the other. (*d*) The shortwing is a brackish water-breeder, and the longwing is confined to fresh water, yet, strangely, the shortwing when in captivity prefers to oviposit in fresh water, while the longwing is indifferent whether it is fresh or salt. If long and shortwinged larvae are bred out together in salt water, the advantage is with the shortwings, and they predominate in the resulting adults. [See this *Bulletin*, Vol. 29, p. 345.] *W. F.*

GABRIEL (Josef). Le paludisme et l'anophélisme en Russie Subcarpathique. [**Paludism and Anophelism in Subcarpathian Russia.**]—*Travaux Inst. d'Hyg. Pub. Etat Tchécoslov.* 1932. Apr. Vol. 3. No. 2. pp. 23–31. With 1 map & 4 figs. on 1 plate. [10 refs.]

In some districts of the part of Czechoslovakia (Subcarpathian Russia) examined, anophelism occurs without malaria, and the presence of the two races of *A. maculipennis*, according to DE BUCK, SCHOUTE and SWELLENGREBEL (see above), was established. (1) The large, longwinged, light-coloured, malaria-indifferent race predominated. Only 3 per cent. were engorged with blood, but 86 per cent. contained hypertrophied fat bodies. (2) The small, short-winged, dark, many-toothed, malaria-active race showed 62 per cent. engorged and only 28 per cent. with enlarged fat bodies. The two races are not separate species, but merge into each other through intermediate forms. Excellent photographs of the wings and maxillary teeth are given. *W. F.*

DJAPARIDSE (P. S.). Zur Frage der Gattungsimmunität bei Malaria. [**Species Immunity in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Sept. Vol. 36. No. 9. pp. 476–478.

Working in a malarious district in Georgia the author studied the question amongst parasite carriers of all three species of malarial parasite. His results are recorded in two tables. These show the percentage of carriers of *P. vivax*, *P. malariae* and *P. falciparum* at various age periods from birth to 60 years. From one district 150 carriers and from another 482 were selected in compiling the tables. Migration of population in these endemic areas was absolutely excluded. The tables show that the percentage of carriers of *P. vivax* falls gradually with increasing age, whilst the percentage of carriers of *P. falciparum* increases. In the case of *P. malariae* such a correlation is not observed. He proceeds to explain the results. He considers that in the case of *P. vivax* a mild or " labile " infection of the organism takes place and this infection may remain in the body for years without producing signs of disease except enlargement of spleen. The presence of the parasite protects against a super infection with the same species ; hence as age advances, this species will be less frequently met with on examination of the peripheral blood. On the other hand the *P. falciparum* causes immediately severe clinical signs and leaves the organism comparatively soon; this brings about an almost complete disappearance of protective power against this species, so that with increasing age in endemic areas the parasite carriers are found to increase. *E. D. W. Greig.*

MALARIA-COMMISSIE UIT DEN GEZONDHEIDSRAAD. Jaarverslag over de Jaren 1930 en 1931 van de Malaria-Commissie uit den Gezondheidsraad [ALDERSHOFF (H.), Chairman]. **[Annual Report for 1930 and 1931 of the Malaria Commission of the Ministry of Health.]**—Reprinted from *Verslagen en Mededeelingen betreffende de Volksgezondheid.* 1932. July. 27 pp. With 2 charts (1 folding).

The Commission have decided against the practical value of anti-larval measures for a country like Holland with its irrigation system and abundance of water. Thorough treatment of the sufferers from malaria, prevention of entry of mosquitoes to houses and destruction of those which have already entered are the measures recommended. An exceptional opportunity for putting these into practice is afforded by the Zuyder Zee reclamation project. Reference is made to what are called control stables in the malaria campaign. These stables, placed in malaria districts, have been used over a long series of years for the collection of mosquitoes and the variation in monthly numbers caught provides a valuable seasonal index of prevalence. Perhaps the most interesting part of the report is the account of experiments in malaria therapy carried out in the country district of Franeker and in Wormeveer. In Franeker from 1928 onwards the treatment of malaria consisted of 1 gm. quinine sulphate daily for 14 days and then 1 gm. daily every 4 days for 3 months. The same protracted treatment was used for each case of relapse. With this treatment relapses were numerous. From July 1929 the treatment was changed to 1 gm. quinine daily for 7 days and the same for each relapse. A more rapid occurrence and some increase of relapses was the result but the cure-rate remained very much the same. By July 1930 a commencement was made of treatment with a combination of plasmoquine and quinine which SINTON had found in British India to reduce the relapse rate from 50 per cent. to 10 per cent. Chinoplasmine tablets (300 mgm. quinine sulphate and 10 mgm. plasmoquine) were administered for two weeks in a dose of 3 tablets per day. The result was astonishing Not one of the 44 primary malaria cases showed a relapse and only one recurrence took place among the 22 relapse cases. Little or no unpleasant symptoms attended the administration. As a control on this operation we have the results in the town of Franeker itself, where quinine therapy alone was practised and where relapses occurred as usual. The bright prospect opened up by this experiment was somewhat dimmed by the experience at Wormeveer. In this case 3 tablets of chinoplasmine were administered to adults and less to children for a full week, beginning in March 1931. Altogether 82 primary cases of malaria were treated and 39 of these suffered from a relapse in the same year. "Further observation is certainly necessary."

The report concludes with an adverse criticism of some of the conclusions reached by JAMES from a study of the results obtained with artificially induced malaria, especially the contention that tertian malaria should exhibit a daily rise of temperature but by an immunization process only shows fever every second day *W F Harvey*

MARTINI (E). Grundsatzliches zur therapeutischen Malaria [**Fundamentals of Therapeutic Malaria.**]—*Dermat Woch* 1932 Oct 22 Vol 95 No 43 pp 1548–1552

The editors asked the author to give his opinion on malaria therapy from the point of view of the malariologist He is inclined to consider that the attitude in Germany towards malaria therapy is too casual Accordingly he takes the opportunity of underlining the risks, both to the patient and the community, which may attend this form of treatment To obviate these risks he enumerates a series of precautions, which in his view, are essential Amongst the risks to the patient he mentions that experience has shown that malaria aggravates many other diseases, in particular tuberculosis [This is not in agreement with the work of KYRIASIDIS, this *Bulletin*, Vol 28, p 118]

E D W Greig

D'HERELLE (F) **Clover and Malaria.**—*Amer Jl Hyg* 1932 Sept Vol 16 No 2 pp 609–617

This paper is written as a reply to the criticisms of the author s hypothesis made by Bruce MAYNE and by STRATMAN-THOMAS (This *Bulletin*, Vol 25, p 557, and Vol 29, p 344) This hypothesis is that the "primary cause of anophelism without malaria is the co-existence in a region of plants pertaining to the genus *Melilotus*, or to another genus presenting the same property, related as it seems to the presence of coumarin in the honey ' on which the mosquitoes feed When the author first published this hypothesis in 1924, he suggested that the glucoside might play a rôle in insects comparable to that which quinine plays in man He now considers that its action is not plasmodicidal, but that the parasites are gradually attenuated until the disease disappears In favour of the hypothesis are cited —(*a*) The freedom of those parts of the Argentine Republic where a scented clover " *trebol de olor* a variety of *Melilotus*, grows (*b*) The disappearance of malaria from certain islands of Zealand, and from the northern provinces of Holland which coincided with the accidental introduction of Melilotus (*c*) The freedom from malaria of those parts of Egypt where clover is grown *W F*

KNOWLES (R) & GUPTA (B M Das) **Clinical Studies in Malaria by Cultural and Enumerative Methods. Second Series.**—*Indian Med Gaz* 1932 Aug Vol 67 No 8 pp 432–446 With 5 charts [12 refs]

The histories of 20 cases of malaria are given with daily parasite counts and temperature readings, in most cases a Bass culture was made at the end of the period of observation, in order to confirm the results of microscopic examination In several of the benign tertian and subtertian cases, spontaneous cure occurred, " this is often, or perhaps usually, followed by relapse " In quartan cases, the infection tended to persist, and spontaneous cure did not occur, a feature of the early stages was high fever associated with so few parasites that they might easily have been missed in thin films. The authors suggest that the number of gametocytes produced is dependent on some factor in the host's metabolism. They consider that one of the most important problems in malaria is a study of the biological factors—individual, climatic and other—associated with variations in gametocyte production. They used atebrin in the treatment of several cases, with excellent results; but a four-day course of atebrin cost three times as much as a ten-day course of quinine. A patient in whom the laevo-rotatory quinine and cinchonidine produced haemoglobinuria was successfully treated with the dextro-rotatory alkaloid quinidine.

W. F.

EARLE (Walter C.) & PEREZ (Manuel). **Enumeration of Parasites in the Blood of Malarial Patients.**—*Jl. Lab. & Clin. Med.* 1932. Aug. Vol. 17. No. 11. pp. 1124–1130. With 1 fig.

This is a modification of THOMSON's method (*Ann. Trop. Med. and Parasit.* 1911–12, Vol. 5, p. 471) which the author prefers to that of SINTON. Ordinary pipettes graduated in cubic millimetres are cut into sections long enough to handle 10 cmm., and are drawn out into fine points, not too small to admit a fine wire. An area 3 by 15 mm. is drawn on a piece of paper which is placed under a glass slide. Ten cubic millimetres of blood are drawn up into the pipette and 5 cmm. are spread over this area on the slide. The resulting thick film is stained with Giemsa. Beginning at one end of the smear, all parasites are counted, in a band, to the other side. Every fifteenth such band is counted so that the sum of the parasites gives the number present in 1/15 of 5 cmm. The pipettes are cleaned with water. The end of the pipette is not wiped after taking up the blood, because as much blood sticks after the spreading of the slide as before. *W. F.*

JAMES (S. P.), NICOL (W. D.) & SHUTE (P. G.). *Plasmodium ovale* **Stephens: Passage of the Parasite through Mosquitoes and Successful Transmission by their Bites.**—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 139–145. With 2 charts.

In 1922, STEPHENS described *Plasmodium ovale*, studied in blood from East Africa, as a new species. In 1927, he confirmed and extended his description in a case from Nigeria. In 1930, Warrington YORKE and Uvedale OWEN showed that the morphological features of the asexual stages of the parasite remain constant when it is passed from person to person by direct blood inoculation. The authors, working with a strain from the Belgian Congo, succeeded in infecting *A. maculipennis* and in transmitting the infection to patients by means of these mosquitoes. They found that the morphological characters of the parasite in its asexual stage were unaltered by passage of the infection through mosquitoes, and that the arrangement of the pigment in young oöcysts was absolutely distinctive. They conclude "that there remains no doubt that *P. ovale* is a separate species, and that its morphological characters in the human and insect hosts are characteristic and constant." [See this *Bulletin* Vol. 20, p. 296, and Vol. 28, p. 606.] *W. F.*

BENHAMOU (Ed.). Paludisme et splénectomie. [**Malaria and Splenectomy.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 685–690. With 3 figs.

Details are given of four cases of splenectomy for splenic anaemia in persons who had formerly suffered from malaria. The operation was followed by recrudescences of the malaria which were very resistant to treatment with quinine and other drugs. The author concludes that splenectomy removes a defensive organ. Adrenalin caused parasites to appear in the blood of splenectomized patients; consequently its action in this respect is not solely dependent upon the production of splenic contractions. *W. F.*

JEMMA (R.). Klinische Feststellungen ueber die Malaria der Kinder. [**Symptomatology of Malaria in Children.**]—*Arch. f. Kinderheilk.* 1931–32. Vol. 95. Nos. 3/4. pp. 227–241.

The author considers that there are profound differences in the clinical picture of malaria in adults and children. The younger the child the more impossible it becomes to detect the classical and well-marked clinical picture of malaria. For a correct diagnosis the medical man has to appreciate a series of symptoms. He discusses these in detail as they manifest themselves in the various systems, digestive, nervous, etc. He then considers the atypical forms of malaria and finally the complications. He considers of special interest the relation between malaria and tuberculosis Malaria definitely aggravates the course of tuberculosis and in malarial children the medical man must keep a vigilant outlook for early signs of tuberculosis. [This view is not in accordance with the observations of KYRIASIDIS (this *Bulletin*, Vol. 28, p. 118).] *E. D. W. Greig*

GIGLIOLI (George). **Clinical Notes, Autopsy and Histopathological Findings from Five Fatal Cases of Quartan Malarial Nephritis from British Guiana.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No 2. pp 177–187. With 4 figs. on 1 plate.

DANIELS first drew attention to the prevalence of nephritis in the Colony ; his figures were based on the results of postmortem examinations. The report by GRACE, No. 3 of the Memoir Series of the London School of Hygiene and Tropical Medicine [this *Bulletin*, Vol. 29, p 73] tends to give a misleading impression by minimizing the importance of this disease in British Guiana. Giglioli [this *Bulletin*, Vol. 28, p. 131] has already drawn attention to the almost specific role of the quartan parasite in the etiology of nephritis, which follows chronic, untreated malarial infection. In the earlier cases, the kidneys are enlarged, the cortex is thickened, and the lesions are prevalently degenerative. In old cases, typical, secondarily contracted kidneys are found, and the lesions are prevalently inflammatory and proliferative. Quartan malarial nephritis presents much the same characters as the nephritis caused by pyogenic infection. *W. F.*

SURBEK (K. E.). Beitrag zur Kenntnis der Malaria-Nephritiden. [**Malarial Nephritis.**]—*Schweiz. Med. Woch.* 1932. July 16. No. 29. pp. 664–666. With 1 fig. [29 refs.]

In a table the author sets forth his observations on 15 cases of nephritis caused by quartan malaria occurring in Sumatra. The course of the disease is subacute or chronic and the symptoms definite. Oedema and ascites are constantly present. Albuminuria is marked. Anaemia is pronounced and there is often an intense infection with *Plasmodium malariae.* If the renal damage is not too advanced the cases respond very well to quinine and the renal symptoms clear up rapidly, He refers to the work of GIGLIOLI in British Guiana (this *Bulletin,* Vol. 28, p. 131) on malarial nephritis. He also discusses acute malarial nephritis due to malignant tertian and mixed infections of malignant and benign tertian. Oedema is not a marked feature of these cases. The blood urea is raised. He has never found in these cases parasitized red cells in the urine. He has never observed a case of acute malarial nephritis pass on to haemoglobinuria. When quinine is administered early the renal symptoms clear up quickly. He notes that nephritis is very rare in inoculated malaria and that might suggest that the nephritis and malaria are not causally connected, but he considers that the favourable conditions under which the inoculated patients are treated accounts for the absence of renal complications.

E. D. W. Greig.

TAYLOR (K. P. A.). **A Valuable Sign in the Differential Diagnosis of Acute Abdominal Malaria.**—*Amer. Jl. Med. Sci.* 1932. Nov. Vol. 184. No. 5. pp. 699–707. [15 refs.]

Alarming abdominal symptoms sometimes occur in malaria ; such cases are usually of the malignant tertian type. They may be differentiated from cases of acute abdominal lesions by the two following signs :—(1) In malaria, macroscopic or occult blood is nearly always present in the gastric contents, and (2) there is absence of involuntary abdominal rigidity. *W. F.*

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE. 1932. Aug. 11. Vol. 26. No. 2. pp. 105–138. With 13 charts.—**Synthetic Antimalarial Remedies and Quinine. Discussion** [JAMES (S. P.), HENRY (T. A.), SWELLENGREBEL (N. H.), DALE (Henry), PRAIN (David), NICOL (W. D.), MANSON-BAHR (P.), SCHULEMANN (Werner), WATSON (Malcolm), CASTELLANI (Aldo)].

Col. S. P. JAMES.—The aim of large-scale antimalarial effort by means of drugs is to provide an abundant, cheap remedy available to the whole population of malarious countries preferably by growing cinchona in these countries themselves, and so to mitigate the severity of the attacks. The aim of antimalarial chemotherapy, on the other hand, is to supplement quinine, regardless of cost, with drugs which are effective in those respects in which quinine fails ; that is to say, in preventing infection of man and mosquito, and in preventing relapses. In practical antimalarial work on a large scale, therefore, the question of competition between quinine and the new synthetic drugs does not arise. Some strains of malaria parasites are more virulent than others, and further study of their biological properties is needed ; for example, in many cases of malaria due to *P. ovale* recovery takes place without treatment, because its biological property of virulence is very low. GRASSI recognized two distinct clinical varieties of Italian malignant tertian, a mild and a severe, *mitis* and *immitis.** Again, it required eight times as much quinine to control the primary attack of cases of malignant tertian malaria infected with the Rome strain, at the Horton hospital, as was required to control cases infected with an Indian strain. In parts of Italy there is need for a better drug than quinine, and atebrin fulfils this purpose. This difference in the resistance of various strains of the same species of parasite greatly increases the difficulty of assessing the value of drugs ; neosalvarsan has a powerful action on the severe Madagascar strain of *P. vivax*, but a very weak action on the mild Dutch strain. Incidentally, plasmoquine with quinine is more effective in preventing recrudescences of this Madagascar strain, than plasmoquine alone. Another complication in drug testing is the degree of immunity which the patient has acquired before treatment. Cases treated at Horton on the first day of the attack, and on each recrudescence, continue to relapse, whatever drug is given ; better results are obtained if treatment is not begun until some tolerance has been acquired. Yet another complication is the natural resistance of the host ; with the same strain of parasite, the attack in one person may be mild, in another very severe. When a person is very susceptible, or the dose of infection very heavy, even so remarkable a drug as atebrin will not cure the case outright. Plasmoquine is a true prophylactic, but the dose required for full protection is too large to be safe ; it is a better preventive of malignant tertian than of benign tertian. Among the ten volunteers at St. Mary's Hospital who were given prophylactic plasmoquine, none had normal primary attacks, but five had primary attacks seven to nine months later (see this *Bulletin*, Vol. 28, p. 973).

Dr. T. A. HENRY said that with the view to finding a cheap drug for the cure of malaria the Malaria Commission of the League of Nations had considered the use of the total alkaloids of cinchona. Cinchona febrifuge, in its modern form, was of variable composition and sometimes contained a large proportion of amorphous alkaloids which were stated to be toxic. The Commission finally decided to suggest the preparation of a new cinchona product, to be called " totaquina," which was to be standardized to contain 70 per cent. of the crystallizable alkaloids including 15 per cent. of quinine (this *Bulletin*, Vol. 29, p. 461). In actual practice such a product can be made in two ways. Firstly, the total alkaloids of a suitable cinchona bark may be extracted and precipitated as an almost white powder ; or, secondly, the residues from quinine sulphate manufacture may be brought up to the required standard by the addition of crystallizable alkaloids. All the totaquina so far made on a commercial basis is of the latter type, and is brown in colour. The barks of *Cinchona succirubra* and *C. robusta*, the total alkaloids of which the Malaria Commission had in mind as furnishing the principal supplies of totaquina, are no longer produced anywhere in large quantities, but it is understood that they can be grown over much wider areas than the species providing the rich quinine-yielding barks for which Java is particularly suited. The cinchona industry is now thoroughly rationalized : a perfectly natural step justified by the chaotic condition into which the industry fell some twenty years ago, when far more bark was produced than could be sold at prices which would keep the plantations in being. The dominant position of this rationalized industry is a factor to be taken into account in the production of totaquina. The suggestion that cinchona planting should be revived under Government auspices in the British tropics needs further consideration. Such a revival would merely renew the old trouble of over-production, and in the long run would benefit nobody. Further, the introduction of synthetic antimalarial drugs may seriously interfere with the demand for quinine, and no one could lightheartedly undertake a large extension of cinchona planting at the present time.

Sir David PRAIN reminded the meeting of the destruction of the indigo and madder industries by the synthetic preparation of indigotine and alizarine, and he said that the existence of the various industries connected with the collection of natural resins and their use in paint and varnish was threatened by the preparation of more satisfactory and permanent varnishes by synthetic methods. The synthetic antimalaria preparations were threatening quinine in the same way, and he agreed with Dr. Henry that the time had come when it was no longer fair or justifiable to urge the extension of cinchona planting.

Professor SWELLENGREBEL spoke of the different degrees of resistance to drugs found among strains of the same species of malaria parasite. He was forced to conclude that JAMES's Madagascar strain of benign tertian was exceptionally refractory to treatment with plasmoquine and quinine, because a large proportion of his own cases infected with this strain relapsed, while PIEBENGA treated 67 cases infected with a native Dutch strain and none relapsed. He considered that a system of prophylaxis and treatment, which was of proved value, might break down under the stress of an unusual number of infective bites or the prevalence of a strain of parasites with a high degree of vitality.

Dr. NICOL reported on the results of the treatment of 161 mosquito-infected cases of benign tertian at Horton. Among them were 21 latent cases in which the primary attack occurred after an incubation of 25 to 40 weeks. Eighty-one of the patients relapsed, but none relapsed later than 12 months after the primary attack. Long relapses or recurrences are not the result of weather conditions : the return of fever is entirely dependent on the date of the original infection. Irrespective of the season of the year, the long recurrences show an interval of seven to nine months from the primary attack, just as the latent cases show an incubation period of the same duration.

Dr. P. MANSON-BAHR reported that in four cases of subtertian malaria from West Africa, schizonts disappeared after 0·9 gram of atebrin had been given, and there were no toxic symptoms. The drug did not appear to have such a powerful action in benign tertian.

Sir Malcolm WATSON said that on a mine which he visited in Africa the medical officers were disappointed with atebrin, and were fully satisfied that it was slower in action than quinine. Possibly the strains were exceptionally resistant.

Professor SCHULEMANN of Elberfield stated that quino-plasmoquine which is plasmoquine combined with quinine in the proportion of 1 to 30, is able to reduce the relapse rate in benign tertian from the usual 50 per cent. to about 3 per cent. : but there are certain resistant strains, such as James's Madagascar strain, where this treatment fails to reduce the number of relapses. In quartan malaria, in actual practice, no relapses have been noted with plasmoquine treatment ; but in subtertian malaria the percentage of relapses is not reduced. It is of great importance that comparative investigations should be made to determine whether a particular strain of parasite occurring in a native in the tropics, shows the same susceptibility to drugs as it does in a European in the temperate zone. A large number of different species of plasmodia occurring in birds was examined by Dr KIKUTH who was not able to find any difference in their susceptibility to drugs It was not until he investigated paddy birds infected with *Haemoproteus orizivorae* that any advance was made In these, it was found that plasmoquine caused the gametocytes to disappear from the blood, but they soon appeared again when the drug was stopped, because they developed from the schizonts lying in the endothelial tissues of the internal organs, where the drug had been unable to reach them When atebrin was given with the plasmoquine, the schizonts were destroyed and the relapses were stopped JAMES's work has shown that in tests on birds it was necessary to transmit the infection by means of mosquitoes, and tests are now being made on those lines

Sir Aldo CASTELLANI said that in his experience plasmoquinine was a less potent drug than quinine, and that in exceptional instances it might start an attack of blackwater *W F*

ORENSTEIN (A J) **Atebrin in the Treatment of Severe Malaria.**—*Brit Med Jl* 1932 July 2 pp 8–10 With 8 charts in text

Eight cases of malignant tertian, some of them complicated by an additional infection with benign tertian, were given one decigram of atebrin and one centigram of plasmoquine three times a day for four successive days, the course being repeated after a few days No unpleasant symptoms due to atebrin were observed (there was slight scleral jaundice in two cases), but in three patients there were cramps and headache ascribed to plasmoquine All the cases were severe, and one was eight months pregnant The results were excellent

W. F.

DE MELLO (Froilano) & DE AZEVEDO (Antonio) Note préliminaire sur l'action plasmodicide de l'atébrine [**The Plasmodicidal Action of Atebrin.**]—*Bull Soc Path Exot* 1932. Oct 12 Vol 25 No 8 pp 874–878

—— BRAS DE SA (L. J) & DE AZEVEDO (Antonio) Résumé des observations concernant l'action plasmodicide de l'atébrine —*Ibid* pp 878–881

The authors received from Dr WICHS of Calcutta a supply of 0 2 gram tablets issued from the Bayer-Meister Lucius laboratories as Erion or Plasmochine E, the names which were first given to atebrin Different species of animals tolerate atebrin in different degrees Cats tolerate 0 05 gram per kilo, but they are killed by 0 1 gram per kilo, though rabbits show no toxic symptoms after this dose When fatal doses have been given there is fatty degeneration in the liver and kidneys [For preliminary tests in the malaria of birds, see KIKUTH, this *Bulletin*, Vol 29, p 705] The authors treated 3 cases of benign tertian, 3 cases of quartan, 6 cases of subtertian, and 6 cases of mixed infection The drug acted well in every case all parasites disappeared under its influence, except the crescents of subtertian, and there were no relapses during periods of observation lasting 1 to 4 months They conclude that atebrin with plasmoquinine will be at least as good as quinine with plasmoquine for use in malarious countries *W F.*

ECKHARDT (A.). Ueber die ambulante Behandlung der Malaria tropica mit Atebrin bei Negerkindern in Afrika. [**Ambulatory Treatment with Atebrin of Negro Children in Africa.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 521–530.

The results are given in four tables. The first shows treatment with atebrin alone, the second and third with atebrin and plasmoquine, the fourth with intramuscular injections of atebrin. He concludes that atebrin has proved very useful in the ambulatory treatment of malignant tertian malaria in 116 negro children. It has an excellent action on the schizonts, but none on the gametocytes. In 4 to 5 days the drug produces both a clinical and a parasitological cure. The short period of treatment required is one of the greatest advantages of atebrin. No toxic effects were noted and it exerted a beneficial action on the general health. No yellow discoloration or photosensitiveness of the skin was noted. The dosage for the children, in grams, was as follows:—

Age.	Daily dose.	Total amount
0–½ year	0·025	0·075–0·1
½–1 „	0·05	0·15–0·2
1–2 years	0·1	0·3–0·4
2–4 „	0·15–0·2	0·45–0·6
4–8 „	0·3	0·9–1·0
Half grown	0·3	1·2–1·5

E. D. W. Greig.

KIKUTH (W.). Atebrin : ein neues synthetisches Malariaheilmittel. [**Atebrin ; a New Antimalarial Synthetic Drug.**]—*Riv. di Malariologia.* 1932. Mar.–Apr. Vol. 11. No. 2. pp. 157–164.

——. I risultati finora ottenuti in clinica col nuovo antimalarico sintetico " Atebrin."—*Ibid.* No. 3. 13 pp. [11 refs.]

This paper is itself a review of all the records of note up to the present of the use of atebrin in malaria and cannot, therefore, be satisfactorily abstracted. The work of SIOLI, PETER, MUHLENS, FISCHER, JAMES, NICOL and SHUTE, GREEN, NAPIER and DAS GUPTA, STRICKLAND and ROY among others is referred to and these have already been noted in this *Bulletin,* 1932, Vol. 29, No. 10, pp. 695 & 705 *et seq.*). The author quotes MÜHLENS and FISCHER that " in benign tertian malaria atebrin has an action on the schizonts at least equal to that of quinine," and he states that all investigators are agreed that " in subtertian malaria atebrin exerts a specific action on the schizonts of *P. falciparum,* but has no effect on the gametocytes " and it acts best, therefore, in conjunction with plasmoquine. The beneficial results in young children with high fever and grave general state are stressed.

A further great advantage being that the course of treatment, 4 days or so, is, though short, effectual.

The use of atebrin in blackwater fever is dwelt on [*tom. cit.*, p. 706] and the comparative absence of signs of intolerance—severe headache (in 2 out of 50 patients treated by GREEN in Kuala Lumpur and 4 with digestive disturbance). The experiment in prophylaxis by NAPIER and DAS GUPTA (*tom. cit.*, pp. 707 & 709) is quoted. In short, this article is an excellent review of our present knowledge with regard to atebrin. *H. H. S.*

JARVIS (O. D.). **Results of Treatment of Malaria by (*a*) Plasmoquine and Quinine, and (*b*) Atebrin, together with Some Observations on Malaria Convalescents.**—*Jl. Roy. Army Med. Corps.* 1932. Sept. & Oct. Vol. 59. Nos. 3 & 4. pp. 190–199; 252–262. With 5 figs.

Cases of relapsing benign tertian malaria to the number of 126 were treated with daily doses of 0·03 gram plasmoquine and 20 grains of quinine for three weeks, with the result that only 6 cases relapsed during the period of observation, which lasted for 12 weeks. Five cases were treated with atebrin, 0·1 gram daily, for seven days. There were no relapses. Atebrin was present in the urine, on an average for 26 days after the conclusion of treatment. In one case it appeared on the second day of treatment and was present for 37 days. (See United Fruit Company's report above.) *W. F.*

MORISHITA (Kaoru), MIYAHARA (Hatsuo) & ISHIOKA (Hiozo). **Studies in the Treatment of Malaria. VII. Experimental Treatment with Plasmoquine (II Report). Effect of 10 days' or 2 Weeks' Treatment in Benign and Malignant Tertian Malaria. VIII. Experimental Treatment with Plasmoquine (III Report). Behaviour of Quartan Malaria towards our 5 Days' Treatment with Plasmoquine and Quinine. IX. On the Therapeutic Value of the Modified Taiwan Method in Various Forms of Malaria.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. July. Vol. 31. No. 7 (328); Sept. No. 9 (330). [In Japanese. English summaries pp. 70–73; 75–76; 88–91.]

The daily dose was 0·06 gram plasmoquine, with or without 0·75 gram quinine sulphate. The period of observation subsequent to treatment was eight weeks. After one week's treatment, the relapse rates were: benign tertian 14 per cent., malignant tertian 43 per cent., quartan no relapses.

Eleven cases of quartan malaria were treated with the smaller daily dose of 0·04 gram plasmoquine and 0·8 gram of quinine sulphate for five days. None of them relapsed but 2 control cases on quinine both relapsed. [See SCHULEMANN, above.]

Anti-malaria measures in Formosa, owing to the configuration of the country, are almost limited to the administration of quinine. Every year some 40,000 persons are treated at public expense. The authors found that though the clinical features were much improved, the method was a failure as regards protection, for 67 per cent. of the benign tertian cases relapsed within 8 weeks *W. F.*

REED (J. G.). **Note on the Passage of Plasmoquine Compound Tablets in the Stools.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. June 30. Vol. 26. No. 1. pp. 95–96.

Two Tamil women who were taking 3 tablets of plasmoquine compound daily, were treated for worms; one was given santonin, the other chenopodium. In the first case, when the stools were searched for worms, several broken tablets of plasmoquine were seen. In the second case, six tablets were recovered almost unchanged from the stools, and as none had been given on the day of the chenopodium treatment, some must have remained in the body for at least 48 hours. *W. F.*

GORODEZKY (A. S.) & FASTOWSKAJA (E. I.). Ueber die Behandlung der Malaria mit Plasmochin. [**Treatment of Malaria with Plasmoquine.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 568–576.

The authors working on practical lines in Artemowka (Don valley) desired to explore more fully than had been already done the uses of plasmoquine. They treated 198 malaria cases, of which *Plasmodium vivax* was found in 142, *Plasmodium praecox* in 15, *Plasmodium malariae* in 2, mixed infection 1; parasites were not found in 38 cases. The scheme of treatment was that recommended by MÜHLENS, 1st week 7 days' treatment, 2nd week 4 days' interval 3 days' treatment, 3rd to 6th weeks as in 2nd week. The doses for adults were 3 tablets of 0·02 gm. plasmoquine thrice daily; for children the dose was proportionately smaller. 124 persons were treated with plasmoquine alone, 71 with plasmoquine compound and 3 with plasmoquine and plasmoquine compound. They conclude from their investigations that the chief advantage of plasmoquine over quinine is from the epidemiological point of view, causing as it does the rapid disappearance of the sexual forms from the peripheral blood. It is quite feasible to employ plasmoquine in ambulatory cases. The capacity for work is more rapidly restored by plasmoquine than by quinine. Another advantage over quinine is that it is tasteless, In children the doses employed were relatively too high and cyanosis was frequently noted. They were unable to correlate the frequency of relapses with the duration of treatment.

E. D. W. Greig.

MIYAHARA (Hatsuo) & ISHIOKA (Hyozo). **Observations on the Velocity and Duration of the Quinine Excretion in the Urine of Malaria Patients.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Sept. Vol. 31. No. 9 (330). [In Japanese. English summary pp. 87–88.]

The velocity of excretion was measured by the time elapsing between the administration of quinine and its appearance in the urine; the duration was measured by the time between administration and the last time when quinine could be detected in the urine. The kind of quinine salt used, and its solubility, made little difference in the velocity and duration of excretion. When quinine was taken on an empty stomach, it appeared more quickly in the urine than if taken after a meal, but the duration of excretion was the same. Magnesium sulphate lowered the velocity of excretion. The smaller the quantity of the drug the lower was the velocity and the shorter the duration. The velocity was very high after intravenous injection and the duration relatively long.

W. F.

OTTOLENGHI (Donato). Untersuchungen ueber die medikamentöse Prophylaxe der Malaria. [**Drug Prophylaxis of Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Dec. Vol. 36. No. 12. pp. 623–637. With 2 figs. [17 refs.]

In the year 1931 the author commenced a program in Italy to test the value of what he describes as therapeutic sanitation (bonifica umana). For the purpose he selected two districts, one near Ferrara the other near Ravenna. At Ferrara the drugs employed were:—(1) Baccelli mixture (each tablet containing quinine hydrochloride 20·00 cgm., iron citrate 0·25 cgm., sodium arsenate, 0·05 cgm.; for children under 10 years the quantity was reduced). The treatment was administered for 2 periods of 3 weeks in May and June with an interval of 10 days. Adults were given 2 tablets in 1st week, in 2nd 3, in 3rd 4. Children under 5 received quinine tannate in chocolate. (2) Quinoplasmoquine (tablets of 1 cgm. plasmoquine, 30 cgm. quinine sulphate). Children under 10 quarter dose. For children under 5 it was given in syrup. It was administered in 2 periods of 10 days each with an interval of 1 month. First period, 1st and 2nd days 3 tablets, 3rd day 2, 4th to 10th day 1. Second period 1st and 2nd days 2, 3rd to 10th, 2. The following table gives the results of the observations at Ferrara on the total population treated (385) up to the end of November :—

Malaria cases in population in percentages.

Treatment	With antilarval measures Reduction	With antilarval measures %	Without antilarval measures Reduction	Without antilarval measures %
Baccelli mixture	6·4 (49·7)	87	13·0 (56·5)	76
Quinoplasmoquine ...	7·8 (68·9)	88	7·1 (53·4)	82
Untreated	12·9 (49·1)	73	16·8 (36·8)	54

Figs. in brackets represent the malarial cases in same population groups in 1930.

At Ravenna 4 zones were chosen and only quinoplasmoquine was administered in the same doses, as in first experiment. Two periods of 10 days treatment with an interval of 5 to 10 days. The results at Ravenna are shown in the 2 following tables :—

Place	Population	Persons treated	Total number malarial cases in summer Te	Tr	Pr	Treat. started
Chiavica Romea ...	600	81	1	—	—	End of May
Control zone ...	345	—	38	—	—	—
Mandriole	582	274	10	—	5 (Te)	Mid June
Primaro	208		2	9	3 (Tr)	
Control zone ...	302	—	43	—	13	—
Fosso Ghiaia ...	368	131	5	—	3	End of May
Control zone ...	111	—	30	—	8	—

Course of malaria in ascertained parasite carriers.

Place	Treated persons	Before M	Te	Tr	After first treat M	Te	Tr	After second treat. M	Te	Tr	In Oct. M	Te	Tr	In Mar. & Apr. M	Te	Tr
Mandriole Primaro	274	126	21	14	118	7	4	89	0	2	86	0	0	34	4	0
Fosso Ghiaia	118*	47	9	-	46	7	-	32	0	-	31	0	-	7	1	-

M=splenic enlargement; Te=benign tertian; Tr=malignant tertian, Pr=primary infection. * 13 more cases treated with quinine tannate.

The author concludes that his experiments and practical observations are of great value for drug prophylaxis, on the basis of quinine and plasmoquine, if they are carried out on the correct lines as laid down in this and other publications. *E. D. W. Greig.*

STOUTE (D. G.). **Clinical Observations on Malaria treated with Tebetren.**—*Lancet.* 1932. Sept. 10. pp. 565–566.

Tebetren is methyl-hydrocupreine-methyl-acridine-dehydrocholate, in which quinine is combined with an acridine dye and united with a bile-salt to render it non-toxic. It was supplied to the author in three-grain tablets and in ampoules. Subcutaneous injections caused sloughing, but intramuscular injections produced no reactions. Routine treatment was oral, and consisted of two tablets every 4 hours, until 60 had been taken. Four such courses were given with an interval of 3–5 days between the courses. The author treated in Zululand some 80 European adults and about 20 children. He concluded from the results that the action of tebetren was even more rapid than that of quinine, and little or no toxic symptoms appeared beyond a fullness of the head, with deafness, and singing in the ears. Fourteen patients who protected themselves from re-infection by screening their quarters had not relapsed during a period of 18 months following treatment. *W. F.*

SERGENT (Et.), SERGENT (A.), TRENSZ (F.) & VOGT (D.). Essais de traitement du paludisme à *Plasmodium praecox* par le 710 Fourneau, seul ou associé à la quinine, chez des paludéens d'Algérie. [**Fourneau 710 in the Treatment of Malignant Tertian.**] —*Arch. Inst. Pasteur d'Algérie.* 1932. Mar. Vol. 10. No. 1. pp. 1–21. With 5 figs.

Fourneau and his colleagues have studied the action of a product bearing the number 710 , like plasmoquine, it is a quinoline derivative ; it has a chain of three carbon atoms, and its molecular weight is 286. It is a yellow powder, soluble in water. They concluded from a study of its action on *Haemoproteus orizivorae* that it could be substituted for plasmoquine with advantage, because it was less toxic and could be produced at a lower cost. MONIER [this *Bulletin*, Vol. 28, p. 1012] treated with the drug 2 paralytics therapeutically infected with *P. vivax*, 2 cases of chronic infection with *P. vivax*, and one chronic infection with *P. falciparum*. The parasites disappeared in all four benign tertian cases ; but one of the naturally infected patients relapsed ten days later. The drug had no apparent effect in the malignant tertian case.

The authors treated 20 cases of subtertian ; 19 were chronic infections in natives, one was a first attack in a European. The doses given were 0·04 gram on the first day, 0·06 gram on the second, and 0·08 gram on the third and following days. A course lasted from 5 to 9 days, and was repeated several times in many of the cases. Eleven cases were treated with 710 alone, and nine with 710 associated with quinine. It proved very toxic, 12 of the 20 patients showed signs of intolerance--asthenia and muscular fatigue, headache, severe abdominal pain, and vomiting. These symptoms disappeared when adrenalin was administered. It had no action on the schizonts of *P. falciparum* ;

crescents were present in only two cases, they disappeared in two to four days. It was difficult to assess the value of 710 in those cases where it was given mixed with quinine. *W. F.*

SUR (S. N.), SARKAR (H. P.) & BANERJI (K. M.) **Plasmochin as a Malarial Gametocide.**—*Indian Med. Gaz.* 1932. Sept. Vol. 67. No. 9. pp. 490–493.

Anopheles were fed on malaria patients, and kept for dissection. The patients were then given 0·02 gram plasmoquine for 3 days. On the eighth day, a blood examination was made and a second lot of mosquitoes was fed on the patients. These comprised 17 cases of malignant tertian, 17 of benign tertian and 9 quartan As a result, out of 679 mosquitoes which had fed before plasmoquine was given 16 per cent. were found infected when they were dissected 12–15 days later, but, out of 456 mosquitoes which fed after plasmoquine treatment, none became infected. The mosquitoes employed in this experiment were *A. fulginosus*, *A. varuna*, *A. stephensi*, *A. ludlowii*, *A. maculatus* and *A willmori*. [It is interesting to note that 13 per cent. of the mosquitoes fed on untreated quartan cases became infected] *W. F.*

SERGENT (Et) & CATANEI (A) Essai de traitement du paludisme des oiseaux (*Plasmodium relictum*) par l'ichthargan [**Ichthargan in Bird Malaria.**]—*Arch Inst Pasteur d'Algérie* 1932 Mar Vol 10 No 1 pp 37–38

The authors administered the drug to canaries infected with *Plasmodium relictum*, but it had no effect upon the parasites *W F*

WINFIELD (G. A.). **A Study of the White and Differential Counts in Six Unselected Cases of Inoculation Malaria.**—*Jl Lab. & Clin Med.* 1932 July. Vol 17 No 10 pp 985–992 With 6 charts [24 refs]

Six cases of inoculated benign tertian malaria were examined Only two were treated with quinine Leucopenia was present, with a gradual return to normal after recovery Neutrophiles fell gradually and showed a marked fall at the termination of the infection , lymphocytes, on the contrary, showed a slight rise throughout the course with a sharp rise at the termination Monocytes showed a moderate rise The Arneth count is of value because the immature, non-filamented neutrophiles are increased in proportion to the severity of the attack. *W F.*

MAYNE (Bruce). **Note on Experimental Infection of** *Anopheles punctipennis* **with Quartan Malaria.**—*Public Health Rep.* 1932. Aug. 26. Vol. 47. No. 35. pp. 1771–1773.

The therapeutic inoculation of benign tertian malaria is useless in the case of negroes, because they are almost completely refractory, but, as they develop severe attacks of malaria after direct blood inoculation with quartan malaria, it became important to infect anopheles with *P. malariae*. Anopheles (157 *A punctipennis*, 39 *A. quadrimaculatus*, and 7 *A. crucians*) were fed on three patients suffering from quartan malaria with the result that six *A. punctipennis* became infected. Gland infection was found in only one, and it was scanty. *W. F.*

TALIAFERRO (William H.). **Experimental Studies on the Malaria of Monkeys.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 429–449. With 1 fig. [51 refs.]

This work was done with *Plasmodium brazilianum*, a quartan-like parasite of Panama monkeys. The immunity which develops during infection is due to the stimulation of the macrophages, especially in the spleen and liver, For the first 48 hours after the injection of a large dose, parasites occur in the sinusoids of the spleen and liver without evidence of phagocytosis or stimulation. At the time of the crisis, the parasites become concentrated in these organs ; but after a day or two of this concentrating process, the macrophages suddenly become very active and destroy them. The splenic follicles swell to several times their normal size, numerous active macrophages appear in the follicles and the Kupffer cells enlarge. This heightened phagocytic activity is specific, and is probably due to opsonization of the parasites by a specific antibody. The author thinks it probable that relapses are due to temporary cessation of macrophage activity. *W. F.*

WARASI (W.). Zur Biologie des Malariaparasiten. [**Biology of the Malarial Parasite.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Aug. Vol. 36. No. 8. pp. 425–429. With 1 text fig. [17 refs.]

It was noted that haemoglobin was never present in the vacuole of the parasite, although the plasmodium has no visible membrane. However when it enters a red cell the parasite becomes enveloped in a membrane, derived from the red cell, which has special properties. He considers that this observation explains why the young parasites have no haemoglobin in the vacuole and enables him to reaffirm that the malarial pigment is a special substance related to melanin ; further it partially explains the action of quinine on the parasite, because the membrane not only isolates the parasite from haemoglobin but also from quinine, the latter being also adsorbed by the former. Therefore quinine has no action on the intracellular parasites, only on the extracellular forms. *E. D. W. Greig.*

OTERO (F. Quintana). Malaria und Blutzuckerkonzentration. [**Malaria and Blood Sugar Concentration.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Sept. Vol. 36. No. 9. pp. 461–473. [46 refs.]

The author reviews the literature of the subject and then records his own observations. In a table he sets forth his blood sugar estimations in 100 cases of benign tertian malaria. In 44 of these he estimated the sugar both before and after treatment with quinine. As a result of his research he concludes that :—Glycaemia was present in 84 per cent. of the malarial cases observed. The rise of the blood sugar has no relation to the attacks ; it may occur either during an attack or in a fever-free interval. The alkali reserve diminishes more during an attack than in a fever-free interval ; the average value in both periods was 48·7. At first the hyperglycaemia is a reaction to the parasite, but later it is almost always caused by lesions of the liver cells. The disturbances observed were all of a temporary character and disappeared with treatment. *E. D. W. Greig.*

CHORINE (V.). Un nouveau traitement du sang en gouttes épaisses pour la recherche des parasites du paludisme. [**A New Method of staining Thick Films for Malarial Parasites.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 561–563.

Dry at a low temperature. Fix in 10 per cent. commercial formalin until dehaemoglobinization is complete, 3 to 15 minutes. Wash. Treat with a solution consisting of 3 cc. of Lugol in 100 cc. of a 2 per cent. solution of potassium iodide, for 3 to 5 minutes. Rinse. Treat with 0·5 per cent. sodium hyposulphite, for 3 to 5 minutes. Wash. Stain in Giemsa, 2 drops to each 1 cc. of hard tap-water, for 1 hour The formalin dehaemoglobinizes and fixes at the same time. It is advisable to add calcium carbonate to the formalin, to neutralize acidity. The optimum pH is 7·3 to 7·5 [see GREEN, this *Bulletin*, Vol. 29, p. 718]. *W. F.*

KOPELOFF (Nicholas), BLACKMAN (N.) & MCGINN (B.). **"Asexualization" of the Plasmodium in Induced Malaria.**—*Amer. Jl. Med. Sci.* 1932. Aug. Vol. 184. No. 2. pp. 262–265.

A strain of malaria, known as the Poughkeepsie strain, has been employed for the treatment of paralytics in New York since August 1929. Transmission has been effected by inoculation of blood. Blood-films from at least one patient at each passage have been examined daily. During this time, the proportion of patients with gametocytes became gradually less, and since October 1930 no gametocytes have been found in any of the films examined. A second strain, known as Institute strain, which has been in therapeutic use since 1923, has long since ceased to produce sexual forms. [The absence of gametocytes was determined by the examination of films only ; attempts to transmit by anopheles were not made.] *W. F.*

BREINDL (V.) & JIROVEC (O.). **Einige Bemerkungen ueber die Nukleal-reaktion bei** *Laverania malariae* **und** *Proteosoma praecox*. [**Observations on the Nuclear Reaction in** *Laverania malariae* **and** *Proteosoma praecox*.]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Nov. 17. Vol. 126. No. 3/4. pp. 184–186. With 3 figs.

Sections from the organs of a fatal case of malignant tertian malaria in the Tropical Diseases Hospital, Hamburg, more particularly the brain, were stained by the Feulgen method, which is a specific stain for nuclear chromatin. Sections were also made of the intestine of culex infected with proteosoma and stained in the same manner. From their investigations the authors conclude that in the dividing forms of *P. falciparum* in the capillaries of the brain as well as in sporocysts and sporozoits of *Proteosoma praecox* in the intestine of culex, a positive nuclear reaction of nuclear chromatin takes place. Contrary to the view of PAWAN [this *Bulletin*, Vol. 28, p. 1025] the nuclei of the malaria parasite and of bird malaria have the same chemical structure as other protozoa. That the reaction is apparently negative in rings and gametocytes is not surprising having regard to the very small amount of chromatin and the smallness of the nuclei in the rings and the diffuse division chromatin in the gametocytes. *E. D. W. Greig.*

WAKESHIMA (Takashi). **Studies on Acid-Alcali-Equivalence in Malaria. I. The CO_2 Content in the Blood-Plasma.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Aug. Vol. 31. No. 8 (329). [In Japanese. English summary pp. 81–82.]

In almost all cases there is a diminution in the alkali reserve and "acidosis," especially during the attack. The average CO_2 content in

13 healthy Formosan Chinese was 56·3 per cent. In malaria patients, it was about 6 per cent. lower. Even 8 weeks after cessation of treatment the normal level had not been reached. *W. F.*

KAPPUS (A.). Ueber die Henry'sche Malariareaktion. [**Henry's Malaria Reaction.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 576–586.

At the 2nd International malaria conference at Algiers in May 1930 HENRY communicated his method of serological diagnosis of malaria, which he had published a few years previously. The method was tried out by the author in the Tropical Diseases Hospital at Hamburg. As it was practically impossible to get true malarial pigment in sufficient quantity for his purposes HENRY employed as antigens iron albuminate and a melanin. The author employed 2 tests, a ferroflocculation and a melanoflocculation. The antigen of the first is a ferrum albuminate (Merck) No. 113 in stock solution of 1–600, for the second he used the choroid of the eyes of freshly slaughtered oxen. He gives full details for carrying out the tests. He investigated 143 sera obtained from 83 different persons. These included malarial cases and controls ; of the former there were 34 cases in which plasmodia had been found in the blood, of which 24 were malignant tertian, 8 benign tertian and 2 mixed infections of these two. As a result of his investigations the author concludes that almost all the positive reactions occurred with sera from malaria cases ; occasionally non-specific reactions occurred correlated with alterations in the serum, *e.g.*, jaundice, pyrexial therapy, etc. He considers the test a valuable help for the diagnosis of malaria, but he is unable to express an opinion as to its value in gauging the therapeutic effects of malarial treatment. *E. D. W. Greig.*

RAMSAY (G. C.) & SAVAGE (J. de la M.). **The Principles and Methods of Malaria Control in Assam.**—*Brit. Med. Jl.* 1932. Oct. 29. pp. 790–792.

A. minimus is the carrier of malaria in Assam. It breeds in clear water and can be found at the grassy edges of streams with a moderate current, for its well-developed tail hooks enable it to hold on ; it is also found in clear stagnant water. It selects places exposed, or partially exposed, to sunshine. It does not breed under dense shade, or in water which is contaminated or contains silt. The heavy monsoon rainfall makes most swamps undrainable. Those that are cultivated cannot be oiled because oil would spoil the crops. These should be dusted with Paris green, and those which are uncultivated should be allowed to grow up in shade. The irrigation channels in the high-lying, terraced rice-fields are intensely malariogenic. Periodic drying by controlled irrigation, or the cultivation of crops which do not require it, is the remedy. Subsoil drainage is too costly and, in most places, it is impracticable, owing to the high level of the subsoil water. The most efficient drainage is by concrete inverts ; but the drains must have a grade of at least 1 in 200, for slow-running drains are intensely malariogenic. For this reason borrow-pits containing clear water should not be connected up with the object of draining them ; the impervious pan at the bottom should be broken to assist percolation, and the water should be contaminated by filling in with soil, refuse from the coolie-lines, or cut jungle. Fish, water-beetles, and other natural enemies of mosquito larvae are all very well in the laboratory, but they are of little use in the field. " Former popular beliefs that dirty water and dense virgin jungle . . . were the sources of malaria in Assam, have been shown to be erroneous, as also the idea that the pioneer who clears or drains is necessarily benefiting mankind. . . . The anopheline mosquito, which transmits our malaria, does not breed under dense shade, or in water which appears to be noisome or revolting. . . In future the control of malaria in Assam will mean less interference with nature and a realization of the fact that the green beauty of vegetation covering rivers, streams, and swamps can be allowed to remain with improved health to mankind." The shade should be dense if it is to prevent breeding ; a practical test is that it should be thick enough to prevent grass growing beneath it. *W. F.*

WALLACE (R. B.). **Cessation of Oiling in a Malarious Area during a Certain Season of the Year.**—*Malayan Med. Jl.* 1932. Sept. Vol. 7. No. 3. pp. 73–81. With 7 charts.

Observations made during a period of 6 years, on a group of rubber estates, demonstrated that malaria had a seasonal incidence in the Malay States, and the author found that during the healthy season, from the middle of October to January, oiling could be suspended with impunity, and with the saving of hundreds of pounds. (See Report of Malaria Advisory Board above and Vol. 28, p. 609.) *W. F.*

CORNER (J. D.). **The Employment of the Portable Pump in Anti-Malaria Schemes.**—*Jl. Roy. Army Med. Corps.* 1932. Aug. Vol. 59. No. 2. pp. 138–141. With 3 figs.

In the station, Kamptee, India, one of the greatest handicaps encountered in anti-malaria schemes is the maintenance of effective drainage of monsoon and post-monsoon rain-water which supplies the chief temporary breeding areas. The nature of the ground—loose, sandy cotton soil- -precluded effective drainage since the sides of any kutcha drain fell in almost immediately after it had been opened up. A fresh problem presented itself this year in the shape of drainage of water from excavations in solid rock. Oiling was unsatisfactory and expensive, and the author, with no available funds for effective drainage solved the problem satisfactorily by the purchase of two small hand-worked rotary pumps at Rs.25 each. [Size and delivery not given.]

The water could be dealt with (1) By pumping and spraying widely over the ground ; (2) by pumping into neighbouring drains ; (3) by pumping into buckets, carried by coolies to the drains ; (4) by pumping small collections of water into one large central pool which could be heavily oiled pending disposal of its contents. [In similar circumstances where, however, larger funds are available, a small portable petrol-driven rotary pump will be found to be efficient and economical and will throw to greater heights.] *H. Home.*

SWELLENGREBEL (N. H.) & DE BUCK (A.). **Plasmoquine Prophylaxis in Benign Tertian Malaria.**- -Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1932. Vol. 35. No. 6. pp. 911–914. With 1 graph.

The authors have reported already (see this *Bulletin*, Vol. 29, p. 357) their attempt to prevent malaria by giving 0·03 grams of plasmoquine daily, beginning on the evening preceding the infecting bites, and continuing for six days. These attempts were unsuccessful except in the one case with which this paper is concerned. After being bitten by infected mosquitoes in September, this man remained in good health until the following April, when he had his first attack of benign tertian fever, 7 months and 18 days after the infecting bites. [See also JAMES in this number.] The remittent character of the fever showed that it was not a relapse following a slight unnoticed attack soon after the bites, but that it was the initial fever which is encountered only in subjects suffering from malaria for the first time in their lives. The infecting strain in this experiment was James's Madagascar strain, and each volunteer was bitten by several mosquitoes. The number of relapses which occurred in the other subjects of the experiment in spite of treatment, the high infection rate by means of mosquitoes, and the short incubation period, showed that this strain possessed an exceptionally high vitality—higher for instance than the strains native to Holland—and it may be that this high vitality, combined with the large number of bites inflicted, was the cause of failure to protect with plasmoquine. The authors conclude that their failure to prevent the primary attack and the relapses cannot be regarded as contradictory to statements announcing satisfactory results elsewhere, but that it shows that a system of proved value in prophylaxis and treatment may break down under the stress of an unusually great number of infected mosquitoes or the prevalence of some strain of parasites of particular vitality. *W. F.*

SERGENT (Edmond) & SERGENT (Etienne). Le péril paludéen à l'armée d'Orient. [**The Malaria Peril of the Army on the Eastern Front.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. Sept. Vol. 10. No. 3. pp. 317–336. With 5 diagrams & 1 map. [17 refs.]

This story tells how the French Army in Macedonia was held up by malaria during the war, and how the danger was overcome by the proper use of quinine. The army disembarked at Salonika in the autumn of 1915. ROSS, LAVERAN and others gave clear warning, in January and February of 1916, that severe malaria would be experienced unless timely precautions were taken ; but although plans were made and orders were issued, the ignorance of the officers, of the common soldiers, and even of the doctors, prevented their proper execution. The authorities charged with the application of prophylactic measures, mocked and laughed at them ; were they not the dreams of doctors haunted by an *idée fixe*? One hospital where proper precautions were taken, and which was properly screened, was regarded with ironical contempt. Perhaps more important than all, the medical officers did not know how to give quinine, and they did not believe in it. The result was disaster. In 1916 there were some 60,000 cases of malaria, in a force of about 115,000 men. In the autumn, there were not more than 20,000 men in the line. General SARRAIL reported to the government that his army was immobilized in hospital. In January 1917 the authors were sent out to investigate and to draw up a plan of action. They decided that antilarval measures on a large scale were not expedient for the protection of an army in temporary occupation of a country, and they recommended quinine prophylaxis rigorously applied. Minute details were given as to the way it was to be given under personal supervision ; everyone was to take quinine every day, not as a medicine but as a ration ; refusal to take it was to be regarded as a refusal to obey orders in the face of the enemy. [The quinine was in tablet form.] A special antimalaria service was created, whose chief duty was to see, by testing the urine with Tanret's reagent, that quinine was being properly given in the different units. The responsible officer was punished, not the private soldier, when the tests were unsatisfactory. Vigorous propaganda was carried out.

The result was success, and the army was saved. A chart shows that whereas in 1916 the malarial peak, in September, was reached with 8,000 primary cases (4 divisions), in 1917 with 8 divisions the peak did not exceed 1,000 primary cases. In 1916, there were 379 deaths from malaria; in 1917, 71 ; in 1918, 54. Tanret's reaction showed that only about 15 per cent. of the men were taking their quinine in 1916, but by 1918 nearly 100 per cent. were taking it. The German army, on the same front, which had no special antimalaria organization, served as a control, and they had much more malaria in 1917 than in 1916. *W. F.*

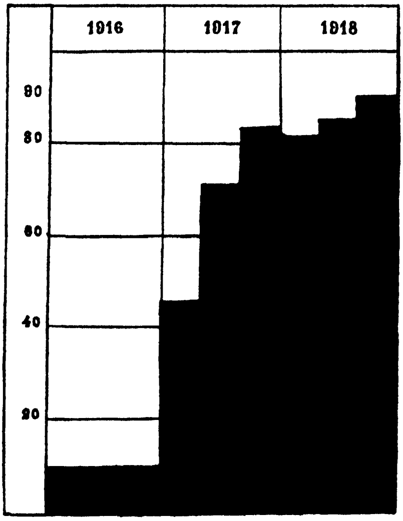


Diagramme 2

Diagram illustrating the efficacy of chemical control of quininisation in the French Army in Macedonia. The number of men found by Tanret's reaction to be properly taking their daily prophylactic dose of quinine was under 15 per cent. in 1916 as against nearly 100 per cent in 1918

[Reproduced from *Archives de l'Institut Pasteur d'Algérie*]

DE ALDA (Martin). Nota sobre las recidivas observadas en los enfermos de paludismo. [**Relapses in Malaria Patients.**]—*Medicina Países Cálidos.* Madrid. 1932. Nov. Vol. 5. No. 6. pp. 511–513.

Having noted an exceptionally large proportion of relapses in malaria patients at Arcos de la Frontera (Cadiz) during the first four months of 1932, the author investigated the question of cause, studying the figures of the preceding two years. He found that in 1930 the method of treatment was to give 40 gm. of quinine [? which salt] over 55 days, namely 15 gm. in the first 15 days, then 1 gm. on alternate days for 30 days and 10 gm. the last 10 days. That year the percentage of relapses was 2·1.

In 1931 a total of 25 gm. in 40 days was given : 10 gm. during the first 10 days and 1 gm. every other day during the next 30 days. The relapse percentage rose to 8·7. In 1932 the routine was to give 20 gm. in 30 days : 1 gm. daily for the first 10 days, and the same dose on alternate days for the succeeding 20 days. The relapses increased to 11·2 and the author concludes that this progressive rise is to be ascribed to the reduction in the total amount of quinine given. *H. H. S.*

NATIONAL MEDICAL JOURNAL OF CHINA. 1932. June. Vol. 18. No 3. [In Chinese. English summaries pp. 519–530.]—**Malaria Number** [10 papers].

This Special Malaria Number contains ten articles in Chinese, three of which have been published in English : the English summaries which are given are not very informative It appears that 20 species of Anopheles have now been reported in China. *A. G. B.*

AMSTERDAM BUREAU FOR INCREASING THE USE OF QUININE Malaria and the Child —84 pp With 22 figs [4 pages of refs]

ANDREWS (Mary N) Note on the Treatment of Sub-Tertian Malaria *P falciparum* with Quino-plasmoquine —*Chinese Med Jl* formerly *Nat Med Jl China* 1932 June Vol. 46 No 6 pp 601–602

ANGOLOTI (E) La asistencia a los palúdicos en el Hospital Nacional de Enfermedades Infecciosas, durante el quinquenio 1927–1931 —*Rev Sanidad e Hig Pública* 1932 Feb Vol 7 No 2 pp 118–124 With 1 chart

ALESSANDRINI (Mario) Su alcuni particolari morfologici dei parassiti malarigeni in casi primitivi non trattati con chinina (On Some Morphological Features of Malarial Parasites in Primitive Cases not treated with Quinine)— *Riv di Malariologia* 1932 Mar –Apr Vol 11 No 2 pp 165–170 [36 refs] English summary (9 lines) pp 269–270

ALONSO ALONSO (Luis) Campaña antipaludica en Marruecos —*Medicina Países Cálidos* Madrid 1932 May Vol 5 No 3 pp 177–210 French summary (4 lines)

ARULLANI (Carlo) La coagulazione del sangue nella malaria (The Coagulation of Blood in Malaria) —*Riv di Malariologia* 1932 Mar –Apr Vol 11 No 2 pp 176–190 [28 refs] English summary (5 lines) p 270

ASCOLI (Maurizio) & DILIBERTO (Ugo). Therapy of Chronic Malarial Splenomegaly —*Southern Med Jl* 1932 June Vol 25 No 6 pp 647–649

BARBER (M A) Malaria Control Work in West Africa —*Southern Med Jl* 1932 June Vol 25 No 6 pp 649–650 [See this *Bulletin*, Vol 29, p 689]

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BARRIER (A K) Screening in Sharkey County —*Southern Med Jl* 1932 June Vol 25 No 6 pp 662–664

BENTMANN (E) Zur Begutachtung der im Gefolge der Kriegsmalaria beobachteten Erkrankungen des Nervensystems —*Arch f Schiffs- u Trop -Hyg* 1932 Apr Vol 36 No 4. pp 163–169 [19 refs]

BONNEAU (E) & FARINAUD (M E) Le paludisme au 9e régiment d'infanterie coloniale —*Bull Soc Méd -Chirurg Indochine* 1932. May Vol 10. No 4 pp 434–448. [15 refs]

Bourguignon (G C) Note complémentaire à propos de l'administration de plasmochine associée à la quinine en vue de l'assainissement des régions impaludées de tierce tropicale —*Ann Soc Belge de Méd Trop* 1932 June 30 Vol 12 No 2 pp 109–112

Bradley (G H) Observations on Some Factors associated with the Breeding of Anopheles Mosquitoes in Northeastern Louisiana —*Southern Med Jl* 1932 May Vol 25 No 5 pp 533–536 [See this *Bulletin*, Vol 29, p 689]

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Bustillo (Vicente) Malarial Orchitis– Case Report —*Twentieth Ann Rep Med Dept United Fruit Company Boston Mass* 1931 pp 110–111

Cardera Compte rendu d un voyage d études malariologiques en Yougo-Slavie et en Italie —*Bull Soc Méd -Chirurg Indochine* 1932 May Vol 10 No 4 pp 449–466

Chahed Un cas de paludisme pernicieux avec coma prolonge pendant la période apyrétique —*Tunisie Méd* 1932 Feb Vol 26 No 2 pp 100 104 With 1 chart in text

Chinese Medical Journal formerly **National Medical Journal of China** 1932 July Vol 46 No 7 pp 719–726 —Medical and Health Reports A Preliminary Survey of the Endemicity of Malaria in Nanking Soochow Hangchow Wukong and Districts along the Yangtze Valley Division of Malariology

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Cook (S S) Problems in Malaria in Haiti —*Southern Med Jl* 1932 May Vol 25 No 5 pp 521–523 [See this *Bulletin* Vol 29, p 688]

Corbia (A) Variazioni della riserva alcalina nelle piressie con speciale riguardo alle malariche (Variations of the Alcali Reserve during Fever Processes and particularly in Malaria)—*Riv di Malariologia* 1931 Nov –Dec Vol 10 No 6 pp 743 751 [13 refs] English summary (4 lines) p 806

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Craig (Chas F) A Review of Recent Contributions on the Treatment of Malaria —*Southern Med Jl* 1932 May Vol 25 No 5 pp 541–544 [10 refs]

Dawson (W T) Antimalarial Value of Cinchona Alkaloids other than Quinine —*Southern Med Jl* 1932 May Vol 25 No 5 pp 529–532 With 1 fig [27 refs]

Faust (Ernest Carroll) The 1930 Status of Malaria in the Southern United States as Determined by Mortality Data —*Southern Med Jl* 1932 May Vol 25 No 5 pp 544–548 With 1 map [See this *Bulletin* Vol 29, p 690]

Garcia de Cosa (Cecilia) & **Fons** (Obdulia) Aportacion al estudio de la plasmoquinoterapia en el paludismo —*Medicina Paises Cálidos* Madrid 1932 Sept Vol 5 No 5 pp 408–423 With 7 figs [15 refs]

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HOOD (Alexander) A Case of Malaria contracted in England —*Jl Roy Army Med Corps* 1932 Nov Vol 59 No 5 pp 373–374 With 1 chart

JACOBI (E) & HERHOLZ Spontanruptur der Milz bei Impfmalaria —*Klin Woch* 1932 Apr 2 Vol 11 No 14 pp 599–602

KARAMCHANDANI (P V) The Place of Plasmochin in the Prophylaxis of Malaria —*Bombay Med Jl* 1932 Apr Vol 1 No 4 pp 124–127 [16 refs]

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KRAUSS (William) Analysis of Reports of 8 354 Cases of Impf Malaria —*Southern Med Jl* 1932 May Vol 25 No 5 pp 537–541 [15 refs] [See this *Bulletin* Vol 29 p 689]

KRITSCHEWSKI (I L) & MEERSON (J S) Ueber die Bedeutung des retikuloendothelialen Apparates bei Infektionskrankheiten IX Die Rolle des Retikuloendothelialsystems bei Vogelmalaria —*Ztschr f Immunitatsf u Experim Therap* 1932 Vol 76 No 6 pp 499–505 With 1 chart

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KUDO (T) Malaria in Fushun Manchuria during the Past Ten Years —*Jl Oriental Med* 1932 Apr Vol 16 No 4 [In Japanese English summary p 50]

LAMBRICHTS Hyperthyroidie et malaria Un cas à Léopoldville —*Ann Soc Belge de Méd Trop* 1932 June 30 Vol 12 No 2 pp 137–141

LASNET (A) & SERGENT (Edmond) Organisation en Algérie de la lutte anti paludique —*Rev d'Hyg et de Méd Préventive* 1932 July Vol 54 No 7 pp 531–542

LEPRINCE (J A) Malaria Control and Anopheles Control Measures of the Past and Future —*Southern Med Jl* 1932 June Vol 25 No 6 pp 651–653

LICHTENSTEIN (A) De doseering van kinine bij malaria —*Nederl Tijdschr v Geneesk* 1932 June 25 Vol 76 No 26 pp 3143-3151 French summary [20 refs]

LINDBERG (K) Traitement préventif par la plasmoquine dans un milieu de haute endémicité paludéenne —*Bull Soc Path Exot* 1932 Oct 12 Vol 25 No 8 pp 912–919

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Mangiacapra (Armando) Sulle neuropatie da malaria Un caso di lesione organica da malaria nel sistema nervoso (On the Neuropathies in Malaria) —*Riv di Malariologia* 1931 Nov -Dec Vol 10 No 6 pp 752–756 English summary (3 lines) p 806

Materna Entgegnung auf die vorstehenden Bemerkungen Wagner-Jauregg's —*Wien Klin Woch* 1931 Oct 30 Vol 44 No 44 pp 1372–1373

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Matsumoto (T) & Motoura (F) Versuche in betreff der Blutdickfilm-Methode bei der Malaria-Massen-diagnose —*Taiwan Igakkai Zasshi* (*Jl Med Assoc Formosa*). 1932 Aug Vol 31 No 8 (329) [In Japanese German summary p 81]

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van Nitsen (R) La quinisation des enfants indigènes dans les camps de l'Union Minière — *Bull Méd du Katanga* 1932 Vol 9 No 4 pp 107-109, 111–115, 117

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[Abridged version of paper summarized on p 62]

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Rieux (J) Hématozoaire et paludisme —*Arch Inst Pasteur d'Algérie* 1932 Sept Vol 10 No 3 pp 337–341

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Torrioli (Mario) Osservazioni sulla fagocitosi nella malaria aviaria (Observations on Phagocytosis in Bird Malaria)—*Riv di Malariologia* 1932 Mar – Apr Vol 11 No 2 pp 171–175 With 3 figs on 1 plate English summary p 270

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Wayl (P) Malaria congenita —*Arch f Schiffs- u Trop-Hyg* 1932 Sept Vol 36 No 9 pp 473–475 A case is described

Wolter (A) Ueber die Schnelldiagnose der Malaria mit Hilfe des Dunkelfeldes —*Dermat Ztschr* 1932 Jan Vol 63 No 1/2 pp 69–72 With 2 figs

Ziemann (Hans) Ueber die etwaigen Beziehungen zwischen Leukämie und Malaria —*Arch f Schiffs- u Trop-Hyg* 1932 Apr Vol 36 No 4 pp 249–252

BLACKWATER FEVER.

MACLEOD (N. C.). **Report on Blackwater Fever in Uganda for 1931.**—*Uganda Protectorate Ann. Med. & San. Rep. for Year ended 31st December, 1931.* Appendix III. pp. 72–76. With 1 chart.

During the year 1931, 162 cases of blackwater fever were reported in Uganda. There were 13 Europeans, 142 Asiatics, and 7 Africans. A table is given showing the number of cases, deaths, and case mortality in Uganda during each of the last 20 years. [This table shows—as also did Ross's similar table for Rhodesia—that the death rate during the last four or five years of the period is quite as large as that during the first four or five years]. Information regarding the incidence of blackwater fever at the various stations throughout the Protectorate, and of the monthly variations in the occurrence of the disease, and the influence of age, race and sex, is summarized in a series of tables. Of the 13 cases which occurred amongst Europeans, two had been between 2 and 5 years in the country, five between 5 and 10 years, one between 10 and 15, and four between 15 and 20 ; in one case, no information was available The blood was examined in 97 cases, and malaria parasites, usually *P falciparum*, were found in 52 of them.

W. Yorke.

GIGLIOLI (Giorgio). **Quartan Malarial Nephritis and Malarial Haemoglobinuria as Family or House Diseases in the Interior of British Guiana. Field Observations on the Epidemiology and Etiology of Blackwater Fever.**—*Riv. di Malariologia.* 1932. Vol. 11. No. 4. 29 pp. With 1 map & 2 charts. [15 refs.]

The following are the conclusions :—

" 1 Data have been collected in the field, during nine and a half years, on the epidemiology of quartan malarial nephritis and blackwater fever in the Demerara River district in the interior of British Guiana The district has a population of approximately 6,500 comprising various races The typical settled populations of the region is constituted by mixed races This population is very subject to malaria and is susceptible to malarial nephritis and haemoglobinuria

" 2 Quartan malaria is relatively a rare infection in the district, representing only 4·1 per cent of malarial infections seen in our Hospital

" 3 Quartan malarial nephritis affects individuals of all ages, but is much more frequent in children Thirty cases have been studied

" 4 Quartan malarial nephritis tends to recur with striking frequency in certain households Five families accounted for 54 per cent of all cases seen among the children in the district Such a condition has been traced to house infection due to *P malariae*

" 5 Sixty-one cases of blackwater have been observed, the incidence of the disease is proportionate to the incidence of new malarial infections. The epidemic curve demonstrates that blackwater is not related to chronic malaria, but to new or recent infection

" 6 Individuals of mixed race and children are most frequently attacked. Negroes and adults, in general, less frequently but when affected are more severely attacked and suffer a higher mortality.

" 7 There is a marked tendency for cases of blackwater to occur in a given locality at approximately the same period. The sequence of cases is in accordance with what might be expected if the disease were transmitted from one case to the other by means of Anopheles, also taking into consideration the conditions of relative immunity presented by a large part of the population of the endemic area, as evidenced by the lower susceptibility of adults and of the Negro race.

"8 Family and house recurrence of blackwater which has been observed in most countries where this disease has been studied, is a striking feature of haemoglobinuria in this district Eight families accounted for over one third of all cases seen By analogy with what has been proven for quartan malarial nephritis, and on other general epidemiological grounds, family and house recurrence of blackwater has been ascribed to house infection

9 House Malaria infection occurs, when Anopheles which have become infected in that same house by feeding on an individual harbouring gametes in his blood, remain in the house for a time sufficient to ensure the maturation of sporozoits, and by feeding on other members of the family transmit the infection *In House Malaria it is the same strain that gets transmitted*

"10 The admission of a malarial house infection characterized by haemoglobinuria in a district where malaria is hyperendemic, and subtertian prevalent but haemoglobinuria is relatively rare necessarily implies house infection which is not identifiable with ordinary malaria In the absence of adequate parasitological knowledge and given the general clinical and epidemiological characteristics of the disease one is led to admit that blackwater, as suggested by NOCHT, should be the direct consequence of infection with certain strains of the various Plasmodia, morphologically indistinguishable from the ordinary forms but characterized by the biological property of producing haemolysis" *W Y*

CHARTERS (A D) **House Infection in Blackwater Fever.** [Correspondence]—*Lancet* 1932 Oct 15 p 867

In this letter the author gives examples which he encountered in Uganda suggesting that certain houses predispose to blackwater fever He considers that —

> "These observations strongly favour the importance of chronic subtertian malaria, which is the prevalent form encountered in this district in the aetiology of blackwater fever, and the view that certain houses predispose to the disease by reason of the shelter which they offer to the infected anopheles mosquito' *W Y*

OTT Les deux types d évolution de la fievre bilieuse hémoglobinurique au Laos [**Two Types of Blackwater Fever at Laos.**] —*Ann de Méd et de Pharm Colon* 1932 July-Aug -Sept Vol 30 No 3 pp 532–545 With 6 charts

The ictero-haemoglobinuric syndrome observed in Laos comprises two categories of fever of quite different evolution The first without doubt appertains to old malarial infection, and the second possibly has some other etiology

Details are given of a patient who, at an interval of forty days, suffered from two febrile attacks which were treated by quinine and followed immediately by haemoglobinuria Although parasites were not found, the author believes that they were definitely of malarial origin as the fever was quickly cured, on both occasions, by the judicious administration of quinine An account is then given of a second case falling into the same category

In contrast with these two observations in which the evolution of the blackwater has to be traced to malaria, a third case is cited in which the course was much longer and more complex, and of difficult interpretation This case, the author states, will give an impression of the second type of bilious haemoglobinuric fever which he has encountered several times at Vientiane, but which appears exceptional in other parts of Laos The patient, who had been at Laos for about 4 years, had contracted malaria and had been successfully treated with quinine : he had never had blackwater fever. On Nov. 8th, 1930, after a prolonged period of good health, he was smitten with a sudden attack of fever and two days later was admitted to hospital. Between 8th and 11th Nov. he was given 2·3 gm. of quinine, and on 12th Nov. he passed blackwater and continued to do so until 15th Nov. The temperature remained slightly raised until 18th Nov., when a series of considerable oscillations commenced, and on 19th Nov. he again passed blackwater. The haemoglobinuria soon passed off, but the patient continued to run considerable temperatures and had two further slight attacks of blackwater. On 25th Nov., when the patient passed haemoglobinuria for the fourth time, a few *P. vivax* were found in the blood. After this there were no further attacks of blackwater, but the patient continued to run a temperature for many weeks notwithstanding the administration of quinine. On 9th Dec., and on several subsequent occasions, spirochaetes were found in the blood by the triple centrifugation method of examination. It was consequently decided to try the effect of an arsenical preparation and three injections of acetylarsan were given, but as each was followed by a rise of temperature the attempt was abandoned. In a second case of a like nature spirochaetes were also found.

Guineapigs were injected with the blood of these two cases. It is recorded that some of these animals died in a few days, others died after a slow infection (20–30 days) and still others survived, but blood from these when injected into a second series of guineapigs produced a fatal infection.

Those animals, which died rapidly, showed a continued loss of weight, and after a brief rise the temperature fell as rapidly as the weight. Those which resisted longer exhibited alternately loss of weight and then a return to the normal weight ; like the former animals they died in a state of cachexia with low temperature.

All the animals showed the same pathological lesions, viz., generalized visceral congestion ; no parasites to be seen ; the organs showed an intracellular and intramuscular ochre-coloured pigment which gave the Prussian blue reaction. No spirochaetes were discovered in the guineapigs ; but the author considers that the changes he has found prove the existence in his patients of a virus, other than Plasmodium, capable of producing in the guineapigs an intravascular haemolysis.

Ott believes that this case shows that there exists at Laos a type of blackwater which is not of malarial origin ; it is seasonal (autumn and winter) ; it resists quinine and arsenic and the prognosis is grave. [Obviously all this will require confirmation before it can be accepted.]

W. Y.

FEYTE (R.). Deux cas de fièvre bilieuse hémoglobinurique. [**Two Cases of Blackwater.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 831–833.

Clinical details are given of two cases of blackwater fever; these call for no special comment. In the second case three estimations of the amount of cholesterin in the blood were made with the following results :—

1. The acute stage : cholesterin 1 gm. per litre.
2. During convalescence : cholesterin 1·16 gm. per litre.
3. After the end of the disease : cholesterin 1·8 gm. per litre.

These figures show that the titre of cholesterin increased as the patient recovered. The author states that this agrees with the findings from Indo-China [this *Bulletin*, Vol. 23, p. 553 and Vol. 29, p. 666] that good results follow the administration of a rapidly diffusible, aqueous preparation of cholesterin, viz., the chlorhydrate of choline. *W. Y.*

GUPTA (B. M. Das). **A Case of Blackwater Fever treated by Atebrin.** —*Indian Med. Gaz.* 1932. June. Vol. 67. No. 6. pp. 330–331. With 1 chart in text.

Clinical details are given of a case which, in the author's opinion, indicate that atebrin may be of value in cases of blackwater fever where the patients are intolerant of quinine. The patient, a Hindu, aged 13, was admitted to hospital on the 21st Jan., 1932, with a history that two weeks previously he had suffered from haemoglobinuria. On admission the urine was normal, but the blood contained scanty *P. falciparum*. Two doses of 5 grains of quinine were administered and were immediately followed by an attack of blackwater fever. Haemoglobinuria continued for 4 days, and the patient became convalescent. On the 16th Feb. there was a slight rise of temperature and the next day *P. falciparum* was again found in the blood. It is stated that there was marked jaundice, but no haemoglobinuria. On the 20th Feb. atebrin, 0·1 gram twice daily, was given for 5 days ; the parasites disappeared and all symptoms subsided.

In the discussion which follows this narrative, the author writes " There seems little reason to doubt that, had quinine been administered during his third attack of fever, haemoglobinuria would have resulted." [This statement is, of course, not justifiable ; the patient might have developed haemoglobinuria, but, on the other hand, he might not.] *W. Y.*

PATERSON (James C.). **The Value of Plasmochin in the Treatment of Malarial Infections encountered in Some Cases of Blackwater Fever and Quinine Haemoglobinuria.**—*Amer. Jl. Trop. Med.* 1932. Sept. Vol. 12. No. 5. pp. 363–368.

The author has examined the blood for malaria parasites in 16 consecutive cases of blackwater fever at the El Centro (? Colombia) hospital. In six of the cases malaria parasites were found, *P. falciparum* five times and *P. vivax* once. It is remarked that the parasites were present in such numbers that they could be demonstrated on the second day of the disease after a large number must necessarily have been destroyed as a result of the initial hàemolysis. [What evidence is there in support of this dogmatic statement ?] The author continues by saying that the question naturally arose whether or not this complication should be treated ; and when three of the six positive cases showed subtertian rings in such profusion that life seemed to be actually threatened, there appeared to be no choice in the matter, Details are given concerning four cases in which plasmochin was given. The other two cases were treated with quinine only, but the drug was withheld until the course of the disease was well advanced ; one of these patients died, and the author considers that death may have been partly due to the fact that the severe subtertian infection which was present was ignored for three days until it was considered safe to begin quinine therapy. Two of the four cases treated by plasmochin were severe infections and could not be safely left until the haemoglobinuria had subsided and quinine could be given without the risk of producing further haemolysis The use of quinine in the acute stage of the disease is undoubtedly dangerous, but plasmochin while not so effective in attacking a subtertian parasite seems to have sufficient action to control most infections until quinine can be safely given

The author summarizes his paper as follows :—

" 1 Malarial parasites were encountered in 37 5 per cent of a series of 16 consecutive cases of blackwater fever and, in all but one, the subtertian form was the offender

" 2 Three of the 6 positive cases showed subtertian ring forms in such abundance that active anti-malarial measures appeared to be imperative

' 3 Quinine cannot be safely administered to such cases of blackwater fever because of the danger of producing further haemolysis On the other hand, plasmochin can be safely used at any stage of the disease and apparently possesses sufficient action to control the infection until such a time as quinine can be given This drug should be equally useful in treating malaria attacks in individuals who suffer from haemoglobinuria as a result of quinine intolerance " • *W Y*

GIGLIOLI (George) **Immunity in Blackwater Fever.**—*Riv di Malariologia* 1932 Vol 11 27 pp With 4 figs [15 refs]

The following abstract is given —

' In the present paper, which is a continuation of the other which appeared in Number 4—1932 of this same Review [*ante*] the author treats further of the epidemiology of blackwater in the interior of British Guiana

' The incidence of the disease in the different races inhabiting the region and in the various age groups receives particular attention The Negro race enjoys a very marked immunity The adult section of the settled population also presents a distinct degree of immunity

' The clinical course of the disease in children and in adults the occurrence of relapses, the relative mortality in the different races and age groups are also examined

The author concludes that definite and specific immunity to blackwater exists and that it manifests itself with the same modalities and limitations which are known to exist as regards immunity to malaria It is not immunity to infection but immunity towards its clinical manifestations

Immunity in conclusion and the distribution and incidence of the specific haemolytic strains of malaria parasites, are the fundamental factors which govern the epidemiology of blackwater it is the degree of immunity of the subject in fact which determines case by case if infection is to be followed or not by the culminating clinical manifestation of the disease, haemoglobinuria

It appears probable that mute ' or clinically negative and therefore unrecognisable infections with haemolytic strains particularly in certain tropical regions, should not be rare , such infections represent the source, the reservoir, of those same infections, which in non-immune subjects, in Europeans for instance, make themselves dramatically evident with the dreaded syndrome of blackwater fever ' *W Y*

OTT Recherches sur la pathogénie et le traitement de la fièvre bilieuse hémoglobinurique Considérations sur la pathogénie du syndrome [**Pathogeny and Treatment of Blackwater Fever.**]—*Bull Soc Path Exot* 1932 July 6 Vol 25 No 7 pp 735-747 With 1 fig

The author devotes himself to an analysis of the factors which may be responsible for the haemolytic process in blackwater fever. While a good deal of it is theoretical, the author marshals a considerable number of experimental observations, made by himself and others, in support of his contentions. The first portion of the article deals with the rôle of hypocholesteraemia and the second part with the rôle of precipitating factors. The main argument can be summarized as follows :—

Cholesterin inhibits, in the animal organism, the lytic action of disintegration products of the lipoids (fatty acids, lysocithins). The cholesterin titre is lowered in malaria and particularly so in blackwater fever. The erythrocytes of blackwater fever patients exhibit a peculiar sensitiveness to various haemolytic agents ; quinine, which, in therapeutic doses, is unable to provoke haemolysis, acts much more efficaciously in the presence of any other haemolysin (sensibilisatrice, lysocithin, etc.).

The author inquired whether from these facts it is not possible to elaborate a satisfactory theory of the pathogenesis of blackwater fever.

The physico-chemical equilibrium of the different components of the blood is destroyed, in chronic malaria, by the improverishment of the erythrocytes in cholesterin. The red cells, deficient in cholesterin, yield up their haemoglobin owing to the action of fatty acids and lysocithins normally occurring in the circulation. This state of affairs arises in certain forms of chronic malaria where, following a red cell fragility, the ictero-haemolytic syndrome gradually develops: but in these cases the degree of haemolysis does not habitually succeed in raising the haemoglobinaemia up to the level of the renal threshold. However, in such patients a simple access of fever, owing to the modifications in the physico-chemical state of the serum which it produces, will suffice to cause haemolysis of such a number of red cells that haemoglobinuria results.

When hypocholesteraemia does not suffice to produce haemoglobinuria, the sudden addition of a supplementary haemolytic agent will raise the lytic titre to the level necessary to destroy the red cells which had hitherto resisted the organic lysocithins ; quinine, even in small doses, will act in this way as has been shown by NOCHT and KIKUTH, and others.

Marcel LEGER, in the discussion which followed this paper, stated that for many years he had made a point of determining the degree of cholesteraemia in numerous patients. He referred to three cases of sleeping sickness in whom, before any treatment was given, the cholesteraemia was below 1 gm. per litre– in one of them it was only 0·58 gm. All three had suffered from febrile disturbances and, before the true diagnosis was made, had been given large doses of quinine ; one had in fact received 52 consecutive intramuscular injections. None of these patients exhibited any signs of haemoglobinuria. *W. Y.*

BRAHMACHARI (Phanindranath), BANERJEA (Radhakrishna) & BRAHMACHARI (Upendranath). **Studies in Blackwater Fever.**—*Jl. Trop. Med. & Hyg.* 1932. Oct. 15. Vol. 35. No. 20. pp. 309–310.

Experiments were conducted to determine the action of quinine bihydrochloride and quinine hydrochloride, in various strengths, *in vitro* upon the haemolytic system. The results, which are given in tables, show that the solutions of the quinine salts, in strengths not having any direct haemolytic action, inhibit haemolysis in the haemolytic system. From these facts the authors argue that if a haemolytic system plays a part in the haemolysis of blackwater fever, then it is possible that the administration of quinine might inhibit the haemolysis. *W. Y.*

McCulloch (W. C.). **The Biochemical Aspect of Blackwater Fever.**—*West African Med. Jl.* 1932. July. Vol. 6. No. 1. pp. 8–11. [14 refs.]

This paper, which is entirely of a theoretical nature, cannot easily be summarized and must be consulted in the original by those interested.

W. Y.

SLEEPING SICKNESS.

LEE (S. W. T.). **Report on Sleeping Sickness for the Year 1931.**—*Uganda Protectorate Ann. Med. & San. Rep. for Year ended 31st December, 1931.* Appendix IV. pp. 77–81.

The incidence of sleeping sickness for the last six years in Uganda is shown in a table, and in a second table the number of deaths attributed to the disease, during the last 27 years, is given. Information is recorded regarding the staff available for sleeping sickness work in Uganda and also regarding slight changes in the 1928 sleeping sickness ordinances. The distribution of cases of sleeping sickness in the various districts during 1931 is briefly discussed and the main facts summarized in tabular form. It appears that the number of new cases of sleeping sickness has steadily declined since 1929. Mr. C. W. CHORLEY is continuing his experiments on the trapping of *G. palpalis*. From the results obtained so far, it appears probable that some of the traps designed by Mr. Chorley will be of great practical value. It is proposed to endeavour to clear one island of *G. palpalis* by using a number of traps, and, if this proves successful, an attempt will be made to clear a suitable area of the foreshore of the lake. *W. Yorke.*

DE MARQUEISSAC. Fonctionnement des équipes de prospection et de traitement du secteur de prophylaxie de la trypanosomiase au Togo. [**Survey and Treatment Brigades in the Prophylaxis Sector of Trypanosomiasis in Togo.**]—*Ann. de Méd. et de Pharm. Colon.* 1932. July-Aug.-Sept. Vol. 30. No. 3. pp. 478–487.

An account is given of the machinery which has been evolved for dealing with sleeping sickness in the Bina river district of Togo. The article should be consulted in the original by those interested. *W. Y.*

DUKE (H. Lyndhurst). **The Polymorphic Trypanosomes of Damba Island, Victoria Nyanza. I.–Their Ability to infect Man.**—*Ann Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 191–206.

The author points out that before the great epidemic of sleeping sickness swept through Busoga and Buganda in the early years of the present century, the island of Damba was thickly populated. Conditions were ideal for the rapid spread of human trypanosomiasis and the people suffered heavily before the survivors were removed to the mainland towards the end of 1909. While the island was inhabited the situtunga were strictly confined to the papyrus and grass swamps. After the evacuation of the island the situtunga began to multiply rapidly. As the antelope multiplied it came more and more into contact with tsetse and the fly followed them into the forest and penetrated the island from end to end. Experiments in 1910 and 1911 showed that *T. gambiense* can survive in antelope for at least 22 months in a form transmissible by tsetse, so that it is justifiable to conclude that once introduced into the situtunga this trypanosome would have an excellent chance of survival. It is not known whether *T. brucei* occurred on the northern islands of Lake Victoria , if it did, the cattle must have been its principal host, because the antelope was, in the early days, protected from the fly by its habits and habitat. The cattle were, of course, all removed at the same time as their native owners.

In 1912, Duke expressed the opinion that three strains isolated from situtunga or *Glossina palpalis* on Damba were descendants of the human trypanosome which decimated the population of Damba. It was expected that the sojourn in the antelope would sooner or later exert an effect on the attributes of the trypanosome. Duke believes that signs of such modifications were discernible in 1920. Three 1932 strains are now being carefully examined, and it is already evident that in one important aspect at least they differ from the earlier strains, the change being still in the direction of a closer resemblance to *brucei*. The ability of these three recently isolated strains to infect man is therefore a point of considerable interest.

The three strains that form the subject of this paper were recovered by feeding on clean monkeys wild *G. palpalis* caught on the shore of Damba Island. The three strains are designated Strain 910, Strain 911, and Strain 912 respectively. Of the three the last proved the most readily transmissible by *G. palpalis*. Laboratory bred *G. palpalis*, cyclically infected with one or other of these three strains, were fed upon four normal human beings, three natives and one European. One native was exposed to infection by all three strains, the other volunteers to two strains each ; none of them became infected.

In the discussion which follows the record of these experiments Duke writes :—

> " The realisation that the Damba trypanosome, and, in all probability, the similar strains carried by *G. palpalis* along the whole northern littoral of Lake Victoria, are innocuous to normal man simplifies considerably the task of reclaiming this fertile territory.
>
> " Attention can now be concentrated wholly on keeping out the human reservoir of the disease in the shape of infected natives from neighbouring foci of human trypanosomiasis."

Duke then passes to a consideration of arguments in support of his theory that *T. gambiense* on Damba Island, on the disappearance of man, adopted the situtunga as its principal mammalian host, and has survived in the antelope, with certain modifications, until the present day. He believes that on this assumption the greatest changes in the trypanosome are to be associated with the actual transition period, whilst the parasite was still engaged in adapting itself to the new host. This he considers to be an answer to a former criticism by the reviewer to the effect that the differences in pathogenicity between his 1912 and 1920 antelope strains were distinctly less than those between the 1912 antelope strains and the strain of *T. gambiense* derived from man. Duke further states that there is as yet no unequivocal evidence that a trypanosome recovered from man's blood may lose its power of infecting man. Whether or not this happens in nature is the main problem of trypanosomiasis research to-day. He does not believe that the *in vitro* technique of the reviewer and his colleagues can be regarded as infallible for settling this point, and he quotes recent observations of CORSON and of ADAMS in support of this contention.

[This paper must be consulted in the original by those interested.]

W. Y.

TAYLOR (A. W.). **The Development of West African Strains of** *Trypanosoma gambiense* **in** *Glossina tachinoides* **under Normal Laboratory Conditions, and at Raised Temperatures.**—*Parasitology*. 1932. Oct. Vol. 24. No. 3. pp. 401–418. With 4 figs. on 1 plate. [23 refs.]

In his introduction the author refers to the well known difficulty of infecting species of Glossina with *T. gambiense* under laboratory conditions Work described in this paper was planned in order to study the infectivity to *G. tachinoides* of a representative selection of strains of *T gambiense* from West Africa with the particular object of determining whether non-transmissible strains occur there as frequently as, according to DUKE, they do in East Africa. In addition it was decided to examine possible factors influencing the *T gambiense* infection rate in Glossina

The following is the author's summary :—

" 1 An account is given of the development of strains of *Trypanosoma gambiense* in *Glossina tachinoides*

' Complete development with infection of salivary glands and hypopharynx occupies from 12 to 40 days and upwards, according to the strain of trypanosome used and the temperature conditions during development

2 It is shown that the first or intestinal phase of development is passed within the extra-peritrophic space and that the lumen or intra-peritrophic space of the gut is not involved

' 3 The importance of the proventricular infection as an index of maturing infections is stressed, and it is shown that filamentar crithidia are always present in this organ in the later stages of infection when infection of salivary glands is taking place It has been proved that these filamentar crithidia may constitute up to 20 per cent of flagellates in the proventriculus and are partly responsible for the further migration to the salivary glands

' 4 An account is given of the infectivity to *G tachinoides* of twenty-six strains of *T gambiense* from epidemic and endemic sleeping sickness areas in Northern Nigeria None of the twenty-six was proved to be non-transmissible and twenty-five of the strains gave Total Infectivity Rates in the tsetse of from 0 9–10 5, the Cyclical Developmental Rates ranging from 0 6–9 8

" 5 No evidence has been obtained that strains of *T gambiense* from chronic cases of human trypanosomiasis in endemic areas are less transmissible by tsetse than strains originating in epidemic areas

' 6 An account is given of experiments in which *G tachinoides* infected with *T gambiense* were exposed to 37°C for varying lengths of time The effect of high temperature during the infecting period is seen in a marked and constant increase in the proportion of tsetse infected In the case of one strain a total infection rate of 77 8 per cent was obtained with true cyclical development in 73 5 per cent of the tsetse used

7 It is suggested that the temperatures at which experimental tsetse are infected in the laboratory with *T gambiense* are excessively low, and an investigation is to be made into the optimum climatic conditions for development of the trypanosome in the fly with a parallel attempt to correlate this with the climatic conditions under which wild tsetse become infected in nature "

[This interesting and important paper should be consulted in the original by all working on the subject] *W Y*

MONTESTRUC (E) Infection et réinfection trypaniques chez un Européen (auto-observation) **[The Author's Infection and Reinfection with Trypanosomes.]**—*Bull Soc Path Exot* 1932 June 8 Vol. 25 No. 6. pp 664–668.

Clinical details are given concerning the patient (a Colonial Medical Officer) who contracted sleeping sickness in Cameroons at the beginning of 1927, and, after having been cured, became reinfected recently whilst on a tour on the Niger river JAMOT, who commented on the case, states that it presents several points of interest The first question of importance was whether the symptoms, which developed in January, 1932, were due to a relapse or were the result of a reinfection; analysis of the evidence indicates that they were probably due to reinfection. In the second place it is interesting to contrast the condition of the patient when the first attack was diagnosed, with his condition at the time the second attack was recognized. On the first occasion he complained of no symptoms and diagnosis was made accidentally in the course of routine examination; on the second occasion the disease started suddenly with a rigor, fever, severe vomiting, and pronounced asthenia. These two groups of symptoms—the one benign and the other severe—correspond with the two great clinical types which are met with at the beginning of the disease. Another point worthy of note is the fact that the patient exhibited a large purpuric area on the dorsum of the left foot, and at the same time enlarged and painful popliteal and crural glands. Unfortunately, these glands were not punctured, but under the influence of treatment they disappeared coincidentally with the purpuric condition. This fact seems to suggest that these abnormal morbid manifestations resulted from the infection. The usual primary manifestation is, however, a non-suppurative furuncle. The furuncle is an expression of the defence of the organism at the point of inoculation; the glandular enlargement usually develops slowly and is painless. JAMOT considers that possibly a patient who had already suffered from one attack of the disease and who was weakened by fatigue and long service in the tropics might react less energetically than normally. *W. Y.*

GUYOMAR'CH. Méningite trypanosomiasique avec amaurose guérie par la tryparsamide. [**Trypanosomal Meningitis with Amaurosis cured by Tryparsamide.**]—*Marseille-Méd.* 1932. June 25. Vol. 69. No. 18. pp. 822–826.

Details are given of a patient who contracted sleeping sickness in his native country—the Ivory Coast. He was recruited in February, 1930, and sent first to Senegal and then to Algiers; the first manifestations of the disease—headaches, stiffness, and pains in the limbs—did not manifest themselves until six months later and their true nature was not recognized. The patient was considered to be a syphilitic because the blood Wassermann reaction was strongly positive, and antisyphilitic treatment was administered. This treatment had, however, no effect and the condition progressed; the patient developed meningeal symptoms with grave bilateral optic atrophy. In January, 1932, he was sent to hospital at Marseilles preparatory to repatriation. Here a lumbar puncture revealed the presence of trypanosomes in the spinal fluid. Notwithstanding the optic atrophy a course of tryparsamide was given; the initial dose was 1 gm. and at the third injection the dose was increased to 3 gm. When he had received a course of 36 gm. the condition had completely changed, and the acuity of vision had steadily improved. *W. Y.*

VAN DEN BRANDEN (F.). Influence défavorable d'un traitement insuffisant et irrégulier sur les résultats obtenus avec le tryponarsyl dans le traitement de la trypanosomiase humaine chronique. [**Unfavourable Influence of Insufficient Treatment with Tryponarsyl on Subsequent Treatment.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 375–378

Whilst revising his record of old chronic cases of sleeping sickness, treated at Leopoldville, van den Branden encountered a number of protocols which seemed to show that insufficient and irregular preliminary treatments exerted an unfavourable influence on subsequent efficient courses of tryparsamide

Details of 5 such cases are given , all received various treatments with atoxyl and tartar emetic and, some time later, long courses of tryparsamide which failed to cure. The author admits that it might be argued that he would have failed to cure these cases even if they had not been previously unsuccessfully treated , but comparison with the results obtained in previously untreated cases (about 60 per cent cures) makes this doubtful He believes that arsenic-resistance produced by the initial treatments plays a part in the subsequent failure to cure with tryparsamide *W Y.*

MACLEAN (George) & FAIRBAIRN (H) **Treatment of Rhodesian Sleeping Sickness with Bayer 205 and Tryparsamide : Observations on 719 Cases.**– *Ann Trop Med & Parasit* 1932 July 14 Vol 26 No 2 pp 157–189 [17 refs]

In the first part of this paper, the authors summarize briefly the results obtained by various workers in the treatment of *rhodesiense* sleeping sickness with Bayer 205 and tryparsamide respectively The series of cases described in the present paper were mostly from the Tabora Province of Tanganyika Territory during the first and second years of an epidemic which swept the northern part of this Province between 1927 and 1930 The other cases occurred between 1925 and 1927 in Mwanza There were 873 cases in the original series, but for various reasons records of 91 had to be discarded Furthermore, 63 cases could not be traced in 1931 The survivors of the remaining 719 cases have all had their general clinical condition and also their blood and cerebrospinal fluid examined from time to time since completing treatment They have been kept under observation for a minimum period of two years and five months from the time they commenced treatment, and some of the Mwanza cases had been observed for more than 6½ years

The following summary is given —

> The treatment of seven hundred and nineteen cases is analysed, and it is shown that with adequate administration of Bayer 205 (4–5 grammes in 1 gramme weekly doses) as many as 73 5 per cent may recover and remain well for a period of twenty-nine or more months, provided treatment is begun within a month of the onset of symptoms This drug is effective in the early stages of infection of the cerebro-spinal fluid Generally speaking the earlier the case the better the chance of cure, and if an uncomplicated case is treated at the onset of symptoms complete recovery is practically certain
>
> It is also shown that a number of cases recover after administration of tryparsamide alone, but it is much less rapid, less effective and less constant in its results than the former drug
>
> " There is no conclusive proof, from a study of these cases, that combined treatment with Bayer 205 and tryparsamide gives better results in moderately advanced cases than the former drug alone, but what evidence there is, supports the view that the combination is an advantage in late cases
>
> ' At a time when cases came for treatment at a more advanced stage of the disease than they generally do now, it was found that none of the cachetic cases ever recovered after the administration of Bayer 205 alone, whereas a few did so after the combined treatment

" For these reasons, combined treatment should always be given when the prognosis is in doubt, particularly as the records suggest that there are some strains or phases which respond specially well to tryparsamide

" The dose of tryparsamide should be 2–4 grammes in adults and a total dosage should be at least 22 grammes

" Except in relapses, where the results are not comparable with those obtained in previously untreated cases, we have a very limited experience of more intensive or prolonged administration of Bayer 205 than that described above

" It is possible that more intensive treatment would give better results in cases in whom the prognosis is doubtful

" Neither age, sex nor a common intercurrent disease like ankylostomiasis has been found to have any material influence on the results of treatment

' The toxic effects of Bayer 205, when administered as described, are rarely of practical importance

The toxic effects of tryparsamide are more serious and cannot always be guarded against In relapsed cases, who appear to be more susceptible, the initial dose should not exceed 2 grammes

' Prognosis is best arrived at by observing the condition of the patient just before treatment, the chief points to be noted being the duration of the illness, the state of the general health and the condition of the cerebrospinal fluid Examination of the patient a few weeks or months after termination of treatment may give quite deceptive results '

[This paper, which contains much important information, must be consulted in the original by those interested.] *W Y*

DE MARQUEISSAC. Propriétés du 205 Bayer-309 Fourneau (moranyl) dans la thérapeutique curative de la trypanosomiase humaine [**Moranyl in the Therapy of Human Trypanosomiasis.**]— *Bull Soc. Path. Exot.* 1932. Oct 12. Vol. 25. No. 8. pp. 898–902.

The author believes that in the majority of cases moranyl can transform a race of trypanosomes, which have become insensitive, into a sensitive race, and that in all cases it can attenuate the virus on which arsenical remedies have proved to be impotent In support of this contention he quotes two cases recorded by Miss PEARCE in her monograph and three cases of his own [On the face of it Miss PEARCE s cases are not quite parallel with de Marqueissac's Miss PEARCE's cases apparently resisted a first course of tryparsamide and later, after a course of Bayer 205, which was said to be without effect, were cured by a second course of larger doses of tryparsamide. Miss PEARCE herself attributes the success of the second course to the fact that larger doses were used, but de Marqueissac writes that in reality the course of Bayer exercised an unfavourable action on the parasites, so rendering them an easy prey to the second course of tryparsamide.] De Marqueissac's three cases differ in that they were all cured by Bayer after several unsuccessful attempts with arsenicals.

The second part of this paper is concerned with a brief discussion of the valuable results obtained by the simultaneous administration of Bayer and tryparsamide. Veritable resurrections were obtained with the combined treatment consisting of moranyl 0·5 gm. + tryparsamide 0·5 gm. The moranyl is first injected, and then, without withdrawing the needle, the tryparsamide. The treatment is given every four days and no ill effects were seen. *W. Y.*

DE MARQUEISSAC. Emploi du 270 Fourneau (orsanine) en prophylaxie itinérante dans le secteur de Pagouda (Togo). [**Itinerant Prophylaxis in Togo with Orsanine.**]—*Bull. Soc. Path. Exot.* 1932. Oct. 12. Vol. 25. No. 8. pp. 902–905.

In view of the encouraging preliminary results obtained with orsanine, it was decided to use this drug in the treatment of all new cases found in the Pagouda sector of Togo. In all, between 1st March and the 1st June, 1932, the drug was given to 890 subjects ; 10 subcutaneous injections were given and the immediate result was a peripheral sterilization in 100 per cent. Notwithstanding the fact that during the three months 9,153 injections were given, the number of accidents, ocular and local, was infinitesimal. The relatively few deaths (4 out of 890 patients) may perhaps be attributed to a progressive arsenical intoxication, and indicate that a certain total dosage (200 mgm. per kilo. for the adult, and 150 mgm. per kilo for old people) should not be exceeded.

W. Y.

PARIS EGUILAZ (Higinio). Contribucion al estudio de los resultados tardios en el tratamiento de la tripanosomiasis humana [**The Late Results of Treatment of Human Trypanosomiasis.**]—*Medicina Países Cálidos.* Madrid. 1932. Sept. Vol. 5. No. 5. pp. 371–407. [83 refs.]

Much of this article is of the nature of a clinical lecture on trypanosomiasis ; the author describes some of the many clinical syndromes which may be met with—glandular, meningitic, hypokinetic, hypertonic, myoclonic and mixed—and the results of examination of the spinal fluid. Details are next given of the various forms of treatment adopted ; atoxyl intramuscularly with tartar emetic intravenously ; tryparsamide and tartar emetic ; Bayer 205 ; and the results on small groups of patients presenting the different syndromes. The patients were from Fernando Po and the sanitary District of Tuplapla. The following are the main conclusions :—

1. Prompt treatment of patients in the period of blood and gland infection results generally in cure.

2. Comparing the results obtained with atoxyl 12 gm., tryparsamide 18 gm., Bayer 205 7·5 gm., patients in the earlier stage respond best to Bayer 205 (or Fourneau 309).

3. Only a proportion of those with the meningitic syndrome is curable (data are insufficient for a decision as to what proportion). The best drug for these patients was tryparsamide, and in arsenic-resistant cases Bayer 205. Atoxyl is useless.

4. Patients with symptoms of meningo-encephalitis usually die. With Bayer 205 transient improvement may be obtained ; atoxyl is of no value, tryparsamide should be the drug of choice since clinical amelioration lasting for a year or even longer has been observed. If in addition there are signs of dementia, tryparsamide is the only drug which the author found at all serviceable ; atoxyl was useless, and Bayer 205 often increased excitability and made matters worse.

5. In European patients a mixed treatment seemed best, Bayer 205 followed 2–3 months later by tryparsamide or vice versa.

6. Bayer 205 is very useful as a prophylactic.

This statement is based on observations of a group of 58 persons to whom the author had given 2 doses (each 1 gm.), and during the succeeding 5 months none developed the disease, whereas on contiguous estates from 7 to 10 per cent were infected. He mentions another group of 44 to whom he gave 2 doses of 1 gm. in successive weeks, with inconclusive results as observation was interrupted by their removal to other estates. *H. H. S.*

YORKE (Warrington) & HAWKING (Frank). **Studies in Chemotherapy. VII. Is the Resistance of a Drug-Fast Trypanosome modified by Transference to a Different Species of Vertebrate Host?**—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 215–237. [15 refs.]

In the year 1908 MESNIL and BRIMONT studying the atoxyl resistance of trypanosomes stated that a strain of trypanosomes made atoxyl-resistant in one species of animal (mouse) lost that resistance when transferred to another host (rat). This finding, which was apparently confirmed by Liverpool workers, has profoundly influenced the minds of all who have been since engaged in studying chemotherapeutic processes, as the authors show by a number of quotations. They noted, however, that no one has of recent years studied the matter experimentally, and since it is of obvious importance when one seeks to ascertain whether the trypanosomes in treated patients are drug-fast or not (on the French authors' theory it would be useless to test that property in inoculated animals) the English authors devote this paper to an experimental re-examination of the question. They used the atoxyl-resistant strain of *T. rhodesiense* referred to in their previous papers and give a number of tables which should be studied by all who are interested. After giving the results of their investigation, in which they entirely failed to confirm the French authors, they subject MESNIL and BRIMONT'S work to a detailed criticism. The gist of this is that they failed to keep before them the fact that resistance is relative; that they employed strains with a comparatively slight degree of resistance; that they used atoxyl which is (for reasons stated in the paper) ill-adapted for the purpose; that they failed to interpret correctly the fact that the same dose of atoxyl has by no means invariably the same effect on different mice infected with the same strain. The authors' summary is as follows:—

"1. Reference is made to the observations of Mesnil and Brimont, and of Breinl and Nierenstein and others, to the effect that a strain of trypanosomes made resistant to atoxyl in the mouse may lose this resistance when transferred to other hosts.

"2. Study of recent reviews and articles relating to chemotherapy indicates that these observations have not only been accepted without question, but have had an important influence on modern conceptions of chemotherapeutic processes and of drug-resistance. Moreover, apart from its academic interest, the matter is one of immediate practical importance in so far as it touches the investigation of the problem whether the development of drug-resistance is a cause of the failures so frequently encountered in the treatment of human trypanosomiasis. For obvious reasons, it is practically impossible to investigate the problem by direct observations on man himself; and, if resistance is lost on the transference of the trypanosome from man to laboratory animals, the fact constitutes a most serious obstacle to the elucidation of this fundamental question These observations impressed upon us the necessity for re-investigating the whole subject

"3 Our experiments failed to confirm the observations of Mesnil and Brimont and of Breinl and Nierenstein and others A strain of *T rhodesiense* made resistant to atoxyl in the mouse continued to manifest its full resistance when transferred to and passaged through, rats, as also did a strain made resistant to tryparsamide in mice when transferred to and passaged through, rabbits similarly a strain made resistant to tryparsamide in the rabbit manifested complete resistance when subsequently transferred to mice Moreover, *in vitro* experiments likewise yielded results which indicate that the character of drug-resistance is not modified by transference of the trypanosome from one host to another

"4 Attention is drawn to the fact that resistance is a relative term and that all degrees of resistance, varying from the sensitiveness of the normal strain to a condition of complete insensitiveness to the largest doses which can be tolerated by the host can easily be produced Whilst atoxyl and other pentavalent arsenicals are excellent drugs for the production of such strains they are for reasons stated relatively poor indicators of the degree of resistance attained by any strain The trivalent arsenicals halarsol and reduced tryparsamide thioglycollate, are immeasurably superior in this respect and enable the degree of resistance to aromatic arsenicals, attained by a strain of trypansomes to be assessed with great accuracy and within wide limits

"5 We have subjected the papers of Mesnil and Brimont and of Breinl and Nierenstein to critical examination and for reasons stated have reached the opinion that the data supplied therein warranted neither the sweeping generalization of Breinl and Nierenstein 'dass die erworbene Atoxylfestigkeit nur fur die betreffende Tierspezies gut halt, in welcher die Atoxylfestigkeit erworben wurde' nor even the more modest conclusion of Mesnil and Brimont 'Nos experiences comparées chez le rat et la souris prouvent en plus que le milieu hôte a une grande importance, pour être exact il faut dire que la race est resistante *dans un organisme donné*"

'6 Our investigations convince us that resistance to the aromatic arsenicals is a stable character which is inherent in the trypanosomes themselves and is in no way dependent upon or modified by, the particular vertebrate host in which the parasite happens to find itself The trypanosome is resistant to the drug itself or in the case of a pentavalent arsenical, to its corresponding trivalent derivative We have found no evidence to support Breinl and Nierenstein's hypothesis that the resistance is directed against a combination of the drug and of the specific serum of the host in which the strain became resistant" *A G B*

YORKE (Warrington). **Drug Resistance with Special Reference to Trypanosomiasis.**—*Brit Med Jl* 1932 Oct 8 pp 668–670

For the last five years the author and colleagues have been engaged in the study of chemotherapy, their results have been published from time to time and have been noticed in this *Bulletin*, the last in the present number (above) Yorke refers here to "the enormous superstructure of hypothesis which has been erected on a most insecure foundation of questionable facts", to such a charge the present work will not be held liable and though the ground has already been covered a fairly full account of this, a paper read at the Centenary Meeting of the British Medical Association, seems justified The story begins with the discovery of chemo-resistance by FRANKE and ROEHL in EHRLICH's laboratory in 1907, and the Liverpool workers have devoted themselves almost entirely to this aspect of their subject

1. Feeling that the problem could not be satisfactorily studied *in vivo* owing to the number of variables their first aim was to find a method whereby a suspension of trypanosomes could be kept alive *in vitro*, in undiminished numbers and with unlowered vitality for at least 24 hours at 37°C.

2 By the use of the technique they worked out they compared the trypanocidal activity of organic pentavalent compounds of arsenic and antimony on the one hand and organic trivalent compounds on the other Whereas the pentavalent compounds were but slightly trypanocidal, a solution of 1 in 1,600 being required to destroy the parasites in 24 hours, the organic trivalent compounds of arsenic were extraordinarily effective, even in a dilution of several hundred millions, sodium arsenite and tartar emetic were intermediate This work, in conjunction with a series of experiments on infected mice, enabled them to reach the conclusion that the therapeutic action of the trivalent compounds of arsenic and antimony is dependent entirely on their amazing trypanocidal power It is unnecessary in this case to assume co-operation on the part of the host, but the pentavalent compounds must undergo a reduction before they become effective

3 They next tested strains of *T rhodesiense* made resistant to atoxyl and acriflavine respectively *in vitro* and *in vivo* against a whole series of drugs—aromatic compounds of arsenic and of antimony, non-aromatic compounds of the two elements, non-metallic compounds, as acriflavine and Bayer 205 It was found that the two strains, acriflavin-resistant and atoxyl-resistant, behaved in exactly the same way, resisting all aromatic compounds of arsenic and antimony, as well as acriflavine but being sensitive to sodium arsenite, tartar emetic, and Bayer 205 Strains made resistant to other aromatic arsenicals behaved in an identical way The general conclusion was therefore reached that if a strain of trypanosomes becomes resistant to any of the aromatic compounds of arsenic or antimony it becomes resistant to the others but not to the non-aromatic compounds Hence the terms arsenic resistance, antimony resistance are incorrect, the resistance is really to the various substituted phenyl radicles of the aromatic compounds

4 They discovered that drug resistance is a stable character of the trypanosomes themselves and in no way dependent on the host (see above)

5 They studied the nature of the change undergone by a drug-fast strain of trypanosomes They found that such trypanosomes owe their resistance to the fact that they do not *in vitro* absorb aromatic arsenicals even though these are present in concentrations rapidly fatal to normal strains

6 Their *in vitro* experiments indicate that the development of drug resistance is fundamentally the result of a process of mutation, though selection may on occasion play a part

7 They studied the factors conducive to the production of drug resistance They found that it varied with different drugs—easily produced by certain aromatic arsenicals and antimonials, much less easily by Bayer 205 and not at all by tartar emetic—and also with the manner in which they were administered The optimum conditions for the production of drug resistance are attained when the trypanosomes are repeatedly exposed to the highest concentration of drug which just fails to destroy them all.

8. Finally is discussed the question of drug fastness in man. Whether the trypanosomes in man become fast to drugs or not is unknown though it is often assumed that they do. The question is probably easy to solve by transferring the parasites to mice and testing their resistance to aromatic arsenicals in these animals. Should such resistance develop it is of great practical importance, for the character may be retained unimpaired for years, and administration of aromatic compounds of arsenic and antimony only increases the resistance. If human beings do develop drug-resistant infections we do not know certainly whether the character survives passage through Glossina, which again is of the greatest importance. *A. G. B.*

i. NICOLLE (Pierre). Etude systématique de l'action synergique du 205 Bayer-309 Fourneau et de l'émétique d'aniline, sur l'infection expérimentale de la souris par *Trypanosoma congolense.* [**Synergic Action of Bayer 205 and Aniline Antimony Tartrate on** *T. congolense* **Infection in Mice.**]—*C. R. Soc. Biol.* 1932. Nov. 4. Vol. 111. No. 33. pp. 434–436. With 1 fig.

ii. LAUNOY (L.). Etat des recherches sur les synergies chimiques trypanocides. Nouveaux faits relatifs à l'étude de leur mécanisme.—*Ibid.* pp. 437–439.

i. Reference is made to the previous work of LAUNOY and his colleagues on the synergic action of Fourneau 309 and certain compounds of antimony [this *Bulletin*, Vol. 29, p. 644]. In the present paper Nicolle presents data suggesting that a similar synergism is seen with Fourneau 309 and aniline antimony tartrate.

ii. In the first part of this paper the author refers briefly to his previous work on the synergic action of certain trypanocidal substances He then passes to a consideration of the mechanism of synergic action. These new observations relate to certain observations—morphological and biological—concerning the action of Bayer 205 (Fourneau 309) on *T. congolense.* When a mouse heavily infected with *T. congolense* is treated with 0·005 gm. of Bayer 205 per 20 gm., the disappearance of the trypanosomes is accompanied by an intense phagocytosis. The infective power of the blood of treated mice exhibits great variations. The blood of some mice is no longer virulent after two hours, whilst that of others of the same series may be infective up to the 5th or 9th or rarely even up to the 17th hour.

As a rule, the evolution of the relapse virus is but slightly modified in the treated mouse and in the passage mouse. In certain cases, however, the relapse virus is much less virulent and the disease may run a course lasting more than six months, the host acting as a carrier. When passed into other mice, the virus is at first but slightly virulent and the virulence gradually increases in subsequent passages. The morphological changes which appear to lead to avirulence but not to sterilization are : achromatosis of the nucleus and granular degeneration of the cytoplasm.

When the relapse virus is subjected to the action of an antimonial compound it is found not to be sensitive to antimony. This fact is opposed to the antimutative theory of MORGENROTH.

Launoy believes that synergic trypanocidal action is due to the prevention of the formation (if they do not already exist), of the resistant forms leading to relapses or (if they already exist) to their inhibition or destruction. *W. Y.*

i. PIERAERTS (G.) & KONNÉ (M.). Recherches sur les associations médicamenteuses à base de Bayer 205 dans les trypanosomiases. I.—Sur les modalités d'obtention de l'action thérapeutique combinée à base de B. 205. [**Association of other Drugs with Bayer 205 in Trypanosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 281–310.

ii. ——. Recherches sur les associations médicamenteuses à base de B. 205-F. 309. II.—Sur le mécanisme de l'action thérapeutique combinée à base de B. 205 —*Ibid.* pp. 313–335. [25 refs.]

i. The authors refer to previous work indicating the advantages resulting from the association of various drugs with Bayer 205 in the treatment of experimental and human trypanosomiasis. They also recall the observation of MORGENROTH [this *Bulletin*, Vol. 21, p. 757] to the effect that it is possible to obtain cures, with non-therapeutic doses of tartar emetic, in animals which, at the time of infection, had been given very small doses of Bayer 205; MORGENROTH in his attempt to explain this phenomenon had postulated an " antimutative action " of Bayer 205. The present authors decided to re-investigate this phenomenon, and their work is the subject of the two papers. In the first they have attempted by varying the technique of administration of the doses and even of the drugs to ascertain the optimum conditions for the phenomenon; and in the second they have endeavoured by various means to explain its mechanism. Rats, infected with the virus Pecaudi-Tumba, which has been maintained in the Brussels School of Tropical Medicine since 1924, were used in the experiments. The results of the very numerous experiments are set forth in a long series of tables. The general conclusions reached in the first paper are as follows :—

1. It is possible with the virus Pecaudi-Tumba to reproduce the phenomenon of MORGENROTH and FREUND if minimum doses of 5 mgm. of Bayer and 15 mgm. of tartar emetic are used.
2. The same doses give equal, if not superior, results if the Bayer 205 be administered at the time of blood infection instead of at that of inoculation, and if the tartar emetic be given at the time of relapse.
3. Instead of awaiting the relapse the tartar emetic can be given 24 or 48 hours after the Bayer 205, but this method does not appear to be followed by a better result than is the former.
4. Tryponarsyl—a pentavalent arsenical—when given 48 hours after 5 mgm. of Bayer 205, appears to be more active than when given alone; but its action is not much increased.
5. Myosalvarsan—a trivalent arsenical—when given 48 hours after Bayer 205 is definitely more active than when given alone.

ii. The work described in the second paper followed two main lines: In the first the trypanosomes, which had been subjected to the action of Bayer 205 in a rat, were passaged into a second rat which was treated with tartar emetic; in the second these steps in combined therapy were performed *in vitro*. In his *in vitro* experiments the author followed closely the technique described by the reviewer and his colleagues [this *Bulletin*, Vol. 27, p. 237]. The results of this work are summarized as follows :—

1. Trypanosomes which had been subjected *in vivo* to the action of 5 mgm. of Bayer 205 for 12 hours, 24 hours, and 11 days, respectively, are not found, when subsequently passed to a new animal, to be more sensitive to 15 mgm. of tartar emetic than are normal trypanosomes.

2. Trypanosomes which had been subjected *in vitro* to the action of a 1/2,000 solution of Bayer 205 for two hours, when they are subsequently injected, either before or after washing, into a new animal, are not more sensitive to 15 mgm. of tartar emetic than are the normal trypanosomes.
3. Trypanosomes which had been subjected *in vitro* to the action of Bayer 205, and had then been washed three times and tested against various concentrations of tartar emetic, proved in half the cases to be more sensitive to the action of this drug than are the normal trypanosomes.
4. Trypanosomes which had been subjected to the action *in vitro* of Bayer 205, after having been washed three times, show in half the experiments a fragmentation which leads to their gradual disappearance. This phenomenon is due to the presence in the nutrient medium of the serum of certain sheep.
5. In another group of experiments, with the blood of different sheep, the fragmentation due to the Bayer 205 was manifest in the presence of only a single serum. This action was well-marked when the concentration of Bayer was 1/1,000 ; it was not evident when the concentration was 1/5,000.
6. It was always possible with the same serum to demonstrate the sensitization to tartar emetic after the action of 1/1,000 solution of Bayer. When the concentration of the solution of Bayer 205 was reduced to 1/5,000 the trypanosomes were found to be no more sensitive to tartar emetic than were the normal trypanosomes.

The paper closes with a theoretical discussion of the meaning of these results. *W. Y.*

VAN DEN BRANDEN (F.) & DUMONT (P.). Sur la conservation de la tryparsamide et du tryponarsyl en climat tropical. [**The Conservation of Tryparsamide and Tryponarsyl in the Tropics.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 379–384.

The Ministry of the Colonies sent to the authors in May 1932 a series of samples of tryparsamide "Poulenc," and of tryponarsyl "Meurice," which had been in the Congo for various periods since December, 1927. It was desired to obtain information regarding the way in which these preparations had conserved their therapeutic properties during their long sojourn in the Tropics. The authors submitted the samples to chemical analysis and tested their toxicity in rabbits ; they reached the conclusion that both preparations had remained unchanged. [Other arsenical preparations examined by the same authors did not keep so well (*Bull. of Hyg.*, Vol. 7, p. 509).] *W. Y.*

RODHAIN (J.) & HENRY (E.). Essai d'activité trypanocide comparée des principaux neo-arsenobenzols novarsenobenzols d'usage courant en Belgique. [**Comparative Trypanocidal Activity of the Arsenobenzols in Use in Belgium.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 359–369.

Evidence has accumulated which shows that the various brands of salvarsan and neosalvarsan exhibit different degrees of toxicity, and furthermore that therapeutic activity is not necessarily proportional to the degree of toxicity. Some specimens of neosalvarsan which are relatively feebly toxic possess good therapeutic properties.

The authors have tested and compared the toxic and therapeutic activities of the various neosalvarsans at present in use in Belgium; these are Neosalvarsan of Lucius and Hoecht's, which is considered to be the standard (League of Nations Committee, 1925); arsébényl Meurice, a Belgian product; and Rhodarsan and Novarsenobillon, French products. The tests were carried out on rats infected with two different strains of *T. brucei-pecaudi*, viz., virus Tumba and virus Madimba. Rats infected with Tumba die, as a rule, in 6 days, and those infected with Madimba in 12 to 20 days.

The general conclusions reached were that with large doses (0·1 gm. per kilo) novarsenobillon was inferior to the other products, and with small doses (0·01 gm. per kilo) arsébényl exhibited the most regular action; apart from these results nothing definite emerged. [In the reviewer's opinion it is not possible to draw any definite conclusions from this work as the number of rats employed was so small. The authors have made no allowance for the fact that individual rats vary. The same dose of the same drug given to a considerable number of rats does not always produce the same therapeutic result. Probably different rats excrete the drug with different degrees of rapidity]

W. Y.

MORRIS (K. R. S.). **The Infection of a Guinea-Pig with** *Trypanosoma congolense* **and** *T. gambiense* **from the Bite of** *Glossina longipalpis*.—*Ann. Trop. Med. & Parasit.* 1932. July 14. Vol. 26. No. 2. pp. 129–138. With 3 charts & 1 fig.

The following summary is given :—

" 1. A mixed infection of *T. gambiense* and *T. congolense* was established in a guineapig from the bite of a wild *Glossina longipalpis*.

" 2. In the first and subsequent passages through guineapigs, *T. congolense* was predominant in the late stages of the infection and apparently was responsible for death ; *T. gambiense* was usually the first trypanosome to appear, but remained in moderate numbers in peripheral blood.

" 3. The infection was more virulent to *Cricetomys gambianus* than to *Mus rattus* ; in both rats *T. congolense* was always swarming in the blood at death. *T. gambiense* only appearing in moderate numbers in the latter stages of the infection

" 4. The infection increased in virulence towards both rats and guinea-pigs in successive passages by injection.

" 5. In a *M. rattus* that developed a septic tail after infection, the *T. gambiense* strain relapsed, but subsequently killed the rat." *W. Y.*

REGENDANZ (P.). Die experimentelle Erzeugung von Schlafkrankheit beim natürlich immunen Pavian durch Infektion des Liquor cerebrospinalis. [**Experimental Production of Sleeping Sickness in Naturally Immune Baboons by Infection of the Cerebrospinal Fluid.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932 Aug. Vol. 36. No. 8. pp. 409–425. With 10 figs. [19 refs.]

A brief summary of the literature is given indicating that baboons cannot be infected with the pathogenic trypanosomes of man and stock. The immunity of the baboon is due to trypanocidal antibodies present in the blood. These are not found in the cerebrospinal fluid, and consequently it occurred to Regendanz to see whether baboons could be infected by intralumbar injection of trypanosomes.

Baboon 1 was injected intrathecally with *T. gambiense* and 15 days later trypanosomes were found in the spinal fluid in large numbers. During the following few months parasites were only once found in the fluid, but a year later they were again found in great numbers, and again also during the 18th, 20th and 22nd months. An increase in the cell count was observed throughout the whole period. The animal died 2 years after the first injection with typical histological changes in the central nervous system.

Baboon No. 2 had repeated intrathecal injections of *T. rhodesiense.* There was no change in the cerebrospinal fluid and no trypanosomes were found. The animal was then injected with *T. gambiense* and a month later trypanosomes were found in the spinal fluid, but at later punctures they were not found. Throughout the whole period, however, there was an increased cell count. Death occurred a year after the injection of *T. gambiense,* and typical lesions were found in the nervous system.

Baboon No. 3 had one injection of *T. rhodesiense* and three of *T. gambiense.* Trypanosomes were never found in the spinal fluid, but the cell count was always increased. Death occurred a year after the first injection of *T. gambiense* and typical lesions were found in the brain.

Baboon No. 4 had six injections of *T. brucei.* No changes were found in the spinal fluid and at death, which occurred 10 months after the first injection, no lesions were found in the central nervous system, so the cause of death was not clear.

The author gives the following summary :—

Whilst infection of baboons is not possible through the blood stream, it occurs after direct inoculation of *T. gambiense* into the cerebrospinal fluid and a chronic infection results.

It remains limited to the spinal fluid ; a blood infection does not develop.

As a result of the cerebrospinal infection, the baboons develop cerebrospinal symptoms, which, however, are not so pronounced as in man. The animals died within one to two years.

The lesions in the brain correspond with those found in human sleeping sickness ; they are very pronounced.

The significance of these results for the understanding of the pathogenesis of human sleeping sickness is briefly considered, and the danger of lumbar puncture in the early stages of this disease is referred to.

The use of baboons is recommended for the testing of chemotherapeutic agents, especially as to their capacity to pass the meningeal barrier and act on trypanosomes in the cerebrospinal fluid. *W. Y.*

REICHENOW (Eduard). Das Verhalten von *Trypanosoma gambiense* in der Kultur. [**The Behaviour of *T. gambiense* in Culture.**]—*Ztschr. f. Parasitenk.* 1932. Sept. 5. Vol. 4. No. 4. pp. 784–793. [11 refs.]

It has been observed that in cultures of trypanosomes the blood forms disappear and are replaced by forms resembling the developmental forms seen in the gut of Glossina. Furthermore, it has been repeatedly stated that strains of *T. gambiense* which are maintained for long periods by passage through the vertebrate host gradually lose their capacity to infect the invertebrate host. These facts suggested to the author that the cause of the frequent failures to cultivate pathogenic trypanosomes successfully was due to the fact that the attempts were usually made with old laboratory strains which had lost the power either to develop in the insect host or in the culture tube. This was the interpretation offered by RAZGHA [this *Bulletin*, Vol. 27, p. 244] to explain the fact that he was able to culture certain strains and not others.

Reichenow decided to repeat and extend RAZGHA's observations. A strain of *T. gambiense* (F), which was readily cultivated immediately after its isolation from man, was found to have lost its cultural capacity completely 3 years later; and this was also the case when monkey or guineapig blood replaced human blood in the culture medium.

A second strain (*gambiense* G) freshly isolated from a patient was successfully cultured through 7 passages during a period of 111 days, and could presumably have been carried on indefinitely. The cultures showed, however, only forms similar to those met with in the gut of Glossina; salivary gland forms were never found. The author believes that in order to produce the latter it would be necessary to alter the constitution of the nutrient medium; but all his efforts in this direction have so far been fruitless. *W. Y.*

NATTAN-LARRIER (L.) & NOYER (B.). Action de l'ultrafiltration et de la chaleur sur le pouvoir trypanolytique des immun-sérums. [**Action of Ultrafiltration and of Heat on the Trypanolytic Power of Immune Serum.**]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1237–1239.

In previous papers (this *Bulletin*, Vol. 29, p. 303 and p. 651), the authors have shown that collodion membranes retain both the protective substance and the curative anti-trypanosomal substance of immune sera. In the present work they have inquired firstly whether these membranes likewise hold back the trypanolytic substance of immune sera, and secondly whether heat had the same action on the trypanolytic power as on the protective power of immune sera.

The authors employed the commercially prepared membranes; filtration was made at a negative pressure of 25 cm. of Hg. With membrane K600 the duration of filtration was 2 hours, and with membrane K250 it was 3 hours. The immune sera were obtained from rabbits infected with *T. marocanum* var. *cameli*. Four experiments showed clearly that the trypanolytic substance readily traverses both membranes K600 and K250. As a matter of fact the concentration of trypanolytic substance in the filtrate was considerably greater than that in the unfiltered serum.

Experiments on the thermostability of the trypanolytic substance showed that heating to 57°C. or 59°C. for 1 hour slightly diminished the trypanolytic action, but never destroyed it. *W. Y.*

EUFINGER (H.), ROTHERMUNDT (M.) & WIESBADER (H.). Das Verhalten der trypanociden Leberfunktion beim Uteruscarcinom und in der Gestationsperiode. [**The Behaviour of the Trypanocidal Liver Function in Uterine Carcinoma and Gestation.**]—Reprinted from *Arch. f. Gynäkol.* 1932. Vol. 151. Nos. 1 & 2. pp. 150–167. With 1 fig.

After briefly reviewing the literature relating to the disappearance or decrease of the trypanocidal substance from human serum in certain pathological conditions, the authors record a number of observations which they have made on the titre of this substance in the serum of pregnant women, of those suffering from eclampsia, and of cases of cancer of the uterus.

The formation of the trypanocidal substance is dependent upon a normal liver function. Decrease in the titre of this substance results from a partial functioning of the liver and especially from a generalized injury of the parenchyma. In cirrhosis of the liver, and in many cases of pernicious anaemia, there is pronounced decrease of trypanocidal substance. In genital cancer there is, as a rule, a slight degree of decrease in the trypanocidal body and this is related to an interference with liver function. Of 17 cases the trypanocidal titre was normal in 3, raised in 2 and much decreased in 12 cases. The two cases in which it was raised had recently been subjected to the influence of Röntgen rays; and observations on the 12 cases in which the titre was lowered indicated that Röntgen rays resulted in an increase in liver function.

At the beginning of pregnancy there is a slight decrease in the trypanocidal titre, whilst during the last month of gestation there is a compensatory increase. In pregnancy intoxications—pregnancy nephritis, and eclampsia—there is, as a rule, no departure from the changes found in normal pregnancy; only in occasional very severe cases is a decrease of the trypanocidal titre to be observed towards the end of pregnancy. *W. Y.*

v. BRAND (Th.), REGENDANZ (P.) & WEISE (W.). Der Milchsäuregehalt und die Alkalireserve des Blutes bei experimentellen Trypanosomeninfektionen. [**The Lactic Acid Content and the Alkali Reserve of the Blood in Experimental Trypanosomal Infections.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Sept. 21. Vol. 125. No. 7/8. pp. 461–468. [13 refs.]

The authors have re-examined the question of the lactic acid content of the blood of rats and rabbits infected with trypanosomes. They found that it is only increased in the agonal or pre-agonal stages of the disease. This agonal increase is, moreover, not confined to trypanosomiasis; it is seen for example in the Bartonella infections of splenectomized rats.

Notwithstanding the increase of the lactic acid content, the alkali reserve of the blood is not decreased in the agonal or pre-agonal stages of trypanosomal infections of rabbits.

The authors were unable to establish by *in vitro* experiments that trypanosomes in their metabolism produce lactic acid. *W. Y.*

DUNN (Lawrence H.). **Experiments in the Transmission of** *Trypanosoma hippicum* **Darling with the Vampire Bat,** *Desmodus rotundus murinus* **Wagner, as a Vector in Panama.**—*Jl. Preventive Med.* 1932. Sept. Vol. 6. No. 5. pp. 415–424.

The following summary is given:—

"1. The positive results in five out of the six experiments in the transmission of "murrina" (the equine disease produced by *Trypanosoma hippicum* Darling) through the agency of the vampire bat, *Desmodus rotundus murinus* Wagner, definitely prove the vampire bat to be a vector of the disease.

"2. The eight bats used readily acquired the disease, either by taking a meal of blood directly from an infected animal or by consuming blood that had previously been taken from an infected animal.

" 3. The incubation periods in the bats were from six to eight days.

" 4. The disease proved fatal to all the bats.

" 5. The interval between infection and death in the bats varied from nine to 27 days. Since the bats seem to feed every night, this long interval gives ample opportunity for them to bite many animals after they—the bats—have acquired the infection. The bats' appetite seems to be in no way impaired by the infection, but, on the contrary, increased, as is the case with equines that have the disease.

" 6. In the five experiments with positive results, the following clean animals became infected through the bites of vampire bats: 25 out of 55 guineapigs (45·4 per cent.), 3 out of 11 horses and mules (27·3 per cent.). One horse and one mule were each infected from a single bite.

" 7. In the light of our present knowledge concerning the vampire bat as a transmitter of " murrina " under natural conditions, it is recommended that equines be protected from the attacks of bats. Fortunately, protection from bats can be effected with greater ease than is the case with diptera or other arthropods. Adequate protection is provided by stabling the equines from the beginning of dusk to dawn in screened shelters, the wire mesh being not more than one inch, or by illuminating the stables with lanterns or electric light." *W. Y.*

REGENDANZ (P.). Ueber die Immunitätsvorgänge bei der Infektion der Ratten mit *Trypanosoma lewisi*. [**The Immunity Processes in** *T. lewisi* **Infections of Rats.**]—*Ztschr. f Immunitätsf. u. Experim. Therap.* 1932. Vol. 76. No. 6. pp. 437–445.

The essential difference between the course of the infection of trypanosmes of the *lewisi* group and that of the pathogenic trypanosomes is that in the former a short multiplication period is followed by a period of chronic infection in which divisional forms can no longer be discovered, whilst in the latter these well-defined periods are not observed. In the pathogenic infections there is either a progressive multiplication of the parasites up to the death of the host (*T. brucei* in mice) or an alternation of increase and decrease in the number of trypanosomes up to the end of the infection (*T. gambiense* in man, and *T. brucei* in the larger animals). The last condition is due to the development of antibodies by the host on the one part, and to the reaction of the parasite to these antibodies on the other.

Previous work by TALIAFERRO and by Regendanz and KIKUTH has shown that the termination of the divisional period of *lewisi* infections in rats is due to an antibody, and that this limits the multiplication of the parasites but is not trypanocidal; and finally that this peculiar antibody is formed mainly in the spleen, because in rats splenectomized before infection the multiplication period was considerably prolonged. COVENTRY considered that in addition to these antibodies another trypanocidal antibody was formed.

Regendanz conducted a series of experiments in which the serum of rats, in the stage of chronic infection with *T. brucei*, was injected into rats at the beginning of the infection. From the results, which are given in a table, it appears that in only two of six rats in the first stage did a decrease or disappearance of parasites follow the injection of the serum of the chronically infected animals. Consequently, it appears doubtful whether COVENTRY'S contention that a trypanocidal substance is developed in the stage of chronic infection can be accepted.

There are certain analogies between the action of the immune serum and that of arsenophenylglycine. The effect of the drug depends largely on the period of the infection when it is given (REICHENOW and Regendanz). Divisional forms are killed by small doses of the drug, whilst the adult monomorphic forms are uninfluenced. Furthermore, heavy infections require larger doses than do light infections; and finally it is noteworthy that doses which fail to cure infections of the first stage nevertheless suffice to bring multiplication to an end. Immune serum behaves in a similar manner.

Regendanz believes that the course of the infection of *T. lewisi* in rats is as follows. When the monomorphic adult trypanosomes are injected into a normal rat they commence to multiply because they are no longer in a medium containing the peculiar division-inhibiting antibody. In response to the infection this antibody is gradually formed, and finally the multiplication period is brought to an end. At the conclusion of this period there may be a decrease in the number of parasites because certain forms which have not yet completed their division are destroyed. In the second period, which lasts for weeks or months, only monomorphic adult forms are seen, because of the constant presence of the antibody. The parasites gradually die and finally the infection terminates.

As the result of a considerable series of experiments, which are summarized in a table, Regendanz was unable to confirm the statement of TALIAFERRO that, in Bartonella-free rats, splenectomy did not give rise to a severe infection. Regendanz believes that splenectomy alone suffices to lessen antibody formation and that consequently the course of the infection is more severe. *W. Y.*

TALIAFERRO (William H.). **Trypanocidal and Reproduction-inhibiting Antibodies to *Trypanosoma lewisi* in Rats and Rabbits.**— *Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 32–84. [32 refs.]

The following summary is given :—

" 1 The trypanocidal property of the serum of rats having recovered from an infection with *T lewisi*, as tested both curatively and protectively, shows the following characteristics .—

" (*a*) It is precipitated with the globulin fraction, sometimes with the euglobulin alone (tables 3 and 4) and sometimes with both the eu- and pseudoglobulin (tables 1 and 2)

" (*b*) It shows a marked *in vitro* affinity for both adult and dividing *T lewisi* and can be removed from immune serum by absorption with the trypanosomes (table 5). Such trypanosomes after being in contact with immune serum are sensitized so that they are quickly killed when introduced into a normal previously uninfected rat

" (*c*) A lysin can be demonstrated sporadically *in vitro* (table 6)

" 2. The reproduction-inhibiting property of serum from rats having recovered from an infection with *T. lewisi*, or from rats still infected but in which the trypanosomes have stopped all reproduction, has the following characteristics .—

" (*a*) Similar to the trypanocidal property it is precipitated with the globulin fraction, sometimes with the euglobulin alone (table 7) and sometimes with both the eu- and pseudoglobulin.

" (*b*) It is produced in rats as a result of immunization with injections of killed trypanosomes (table 9)

" (*c*) Unlike the trypanocidal property it shows no persistent *in vitro* affinity for either dividing or adult *T. lewisi* and cannot be removed from immune serum by absorption with trypanosomes (table 8). Similarly neither dividing nor adult trypanosomes are sensitized *in vitro* by treatment with serum containing the property

"3. The trypanocidal property and the reproduction-inhibiting property of immune serum can be separated by absorption with *T. lewisi* (table 10). In addition their *in vivo* activity on the parasites is strikingly different and one may be formed by a host without the other (table 17). The reproduction-inhibiting property seems to be a new type of antibody for which the name *ablastin* is proposed.

"4. Both trypanocidal and reproduction-inhibiting antibodies play an important rôle in the immunity of recovered rats to a second infection with *T. lewisi* (tables 11, 12 and 13).

"5. It is not clear whether the persistence of the trypanocidal and reproduction-inhibiting antibodies in the blood after apparent recovery is always associated with the persistence of a few trypanosomes in the body. In some cases, as the result of splenectomy and other treatment affecting the reticulo-endothelial system, the infection will relapse many months after an apparent cure (tables 14 and 15).

"6. Immune serum from rabbits immunized with *T. lewisi* contains only the trypanocidal property and not the reproduction-inhibiting one (table 17). The trypanocidal property of such serum possesses the same properties listed under number 1 for the immune serum from rats (table 16)."

W. Y.

i. DIAS (Emmanuel). Sur les déjections du *Triatoma megista.* Aspects du *Trypanosoma cruzi* que l'on y rencontre. [**The Dejecta of *T. megista.* Morphology of *T. cruzi* found therein.**]—*C. R. Soc. Biol.* 1932. Nov. 4. Vol. 111. No. 33. pp. 486–489. With 2 figs.

ii. ——. Expériences sur la transmission du *Trypanosoma cruzi* de l'insecte au vertébré. [**Transmission Experiments.**]—*Ibid.* pp. 490–492.

i. In Triatoma, as in all insects, there are two kinds of dejecta—the faeces and the malpighian excretion. The faeces are black and desiccate slowly. The urinary excretion is of two types: a yellowish turbid liquid, rich in crystals, and a colourless transparent liquid. In general, a few minutes after feeding, the Triatoma emits faeces or yellow urine; a little later it emits a fluid which may be perfectly clear or which contains faeces. At various intervals the insect continues to excrete clear dejecta. The day after the meal the urine becomes thick and yellow and contains numerous urate crystals. All subsequent dejecta exhibit these characters.

The chief interest of the clear urine is that when it comes from infected Triatoma it contains trypanosomes, sometimes very numerous. Examination showed that they are metacyclic forms; crithidial forms are always rare or absent. The metacyclic forms are very motile, thin and elongated; they are 17 μ in length, the nucleus is elongated and central or displaced posteriorly, and the blepharoplast is round and situated some distance from the posterior extremity. The metacyclic forms are capable of penetration and will infect if placed on the eye or on the undamaged skin of a guineapig.

ii. The author has attempted to infect guineapigs by allowing infective Triatoma to bite them, and by placing the clear malphigian excretion on the eyes and on the unbroken skin. Three guineapigs, which were bitten by infective insects, did not become infected, whilst the clear malphigian secretion containing metacyclic forms infected one guineapig when placed on the eye and three guineapigs when placed on the normal skin. *W. Y.*

GREMEAU (R P) L'emploi d'un nouvel excipient de la tryparsamide le serum de cheval (hémostyl) **[Horse Serum as an Excipient of Tryparsamide.]**—*Rev Méd et Hyg Trop* 1932 July-Aug Vol 24 No 4 pp 176–179

In this short article the author advocates, mainly on theoretical grounds, the use of dilute horse serum instead of water as an excipient for tryparsamide *W Y*

VON JANCSÓ (N) Wirkungsmechanismus der Chemotherapeutica bei Trypanosen **[Mechanism of the Action of Chemotherapeutic Agents upon Trypanosomes.]**—*Klin Woch* 1932 July 30 Vol 11 No 31 pp 1305–1307

This paper repeats the experimental facts and conclusions fully described in previous papers by the author, and summarized in this *Bulletin* Vol 29, p 646 *W Y*

CHATTON (Edouard) A propos du rôle de la membrane péritrophique des glossines dans l évolution du trypanosome du crocodile *T Grayi* (=*T Kochi*) —*Bull Soc Path Exot* 1932 June 8 Vol 25 No 6 pp 575–577

CLIMATIC BUBO AND LYMPHOGRANULOMA INGUINALE.

DE WOLF (H. F.) & VAN CLEVE (J. V.). **Lymphogranuloma Inguinale.** *Jl. Amer. Med. Assoc.* 1932. Sept. 24. Vol. 99. No. 13. pp. 1065–1070. With 4 figs. [35 refs.]

A general account of the disease which needs no comment, followed by a most interesting account of results obtained between August 1930 and March 1932 by Frei's skin test. These are summarized below.

1,010 persons in the Cleveland Hospital tested, 93 more than once. 58 yielded positive reactions; of these (*a*) 31 showed the clinical picture of L.I. 10 W.M.*; 20 C.M.; 1 C.F.

(*b*) 4 had been treated for the adenopathy previously but since recovered, 1 W.M.; 2 C.M.; 1 C.F.

(*c*) 20 gave a typical history of L.I. 19 W. and C.M.; 1 C.F.

(*d*) 3 cases of ano-rectal disease. 1 W.M.; 1 W.F.; 1 C.F.

11 upon whom 21 tests were made gave "confusing reactions," that is to say these were not definitely positive; none of these had signs or history of L.I. [A point which emphasises the necessity of only accepting frank positive reactions.] 941 were negative and had no manifestations nor history of the disease.

75 chancroid cases, 41 with buboes, 55 Ducrey bacillus positive, 22 W.M.; 46 C.M.; 3 W.F.; 5 C.F. 2 only gave positive L.I. skin test—one of these was a double infection with L.I.; the other had a history of adenitis 18 months before.

84 cases early active syphilis: 0 Frei positive. 58 cases frank gonorrhoea: 4 Frei positive; all gave a previous history of inguinal adenitis.

The ano-rectal cases consisted of (*a*) a white male who admitted forced sodomy while a prisoner in 1919; there was rectal stricture and anal growths but no inguinal adenitis and no penile scar. W.R. negative. (*b*) A white female who had cerebral syphilis but was smear negative for gonococcus. She had a rectal stricture 5 cm. above the anus. (*c*) A coloured woman with no evidence of gonorrhoea, no inguinal gland enlargement and negative Wassermann and Kline reactions. She showed rectal stricture, anal fistula and fistulous communication between a perirectal gland and the vagina together with signs of perimetritis. *H. S. Stannus.*

LUJÁN (Mario) & ROTTER (Werner). Lymphogranuloma inguinale bei Kindern. [**L.I. in Children.**]—*Klin. Woch.* 1932. Aug. 13. Vol. 11. No. 33. p. 1387.

A most instructive account of wholesale L.I. infections in a household at San José in Costa Rica. Two children (A and B) sisters, aged 6 and 7 years, developed bilateral inguinal adenopathy within a week of each other, the one with constitutional symptoms, the other without. In the one the gland masses were excised when the size of hen's eggs; in the other, in which they were the size of duck's eggs, resolution took place under treatment with electro-collargol. The father denied any venereal disease or gland swelling. A Frei skin reaction was not performed on him. The mother (C) denied venereal disease and an exhaustive examination revealed no clinical manifestations but the W.R. was positive and Frei test positive.

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* W.M. = White male; C.M. = Coloured male; W.F. = White female; C.F = Coloured female.

A 16-year-old daughter (D), *i.e.*, an elder sister of A and B, was found to have had inguinal buboes a year before. A girl cousin (E) of the mother who lived in the house had been operated on for the same complaint a year ago and been nursed by the mother (C). She had been infected by a man who was known to have had buboes. Two other female cousins (F and G) of the mother who also were in the house had also had buboes a year ago. Whether these two girls had contracted their disease venereally is unknown, but it seems certain that the two children A and B acquired their disease by simple contact with one of the other girls in bed or from the mother, " a carrier " who obtained infection by nursing her cousin E. *H. S. S.*

AMTMAN (Leo) & PILOT (I.). **Lymphogranuloma Inguinale. Report of Three Cases from Chicago.**—*Arch. Dermat. & Syph.* 1932. Nov. Vol. 26. No. 5. pp. 868–878. With 4 figs. [21 refs.]

A record of three cases of inguinal adenitis clinically resembling L.I. One had been in Nicaragua shortly before, the others were resident in Chicago. In none was there a history of primary lesion and exposure was denied. They all gave positive skin reactions with an antigen provided by FREI. *H. S. S.*

SULZBERGER (Marion B.) & WISE (Fred). **Lymphopathia Venereum. (Lymphogranulomatosis Inguinalis of Nicolas, Favre and Durand.)** —*Jl. Amer. Med. Assoc.* 1932. Oct. 22. Vol. 99. No. 17. pp. 1407–1410. With 2 figs. [17 refs.]

A short general description of L.I. and some of those other conditions which have come lately to be regarded as due to infections with the virus of L.I.—elephantiasis of the genitals and rectal stricture.

[There is nothing new to be noted in this paper but attention is called to the following dictum—" The position of the stricture following Lymphopathia venereum is usually high in the rectum." This is a statement at complete variance with the observations of other authors who usually refer to the fact that it is " low." It is most commonly found 3–8 cm. above the anus. " Venereum " should surely be "venerea."] *H. S. S.*

LUTZ (K.). Entzündliche Rektumstrikturen durch Lymphogranuloma inguinale. [**Inflammatory Rectal Stricture due to L.I.**]—*Deut. Med. Woch.* 1932. Aug. 26. Vol. 58. No. 35. pp. 1360–1361.

In this interesting clinical article are given the case notes of four women, all with practically the same history—increasing constipation, the passage of blood, mucus and pus by the bowel, ring stenosis of the rectum 3–5 cm. above the anus, with ulceration and papillomatous growths of the mucous membrane for some distance above the stricture and infiltration of the bowel wall. In one there was a cockscomb-shaped condyloma-like mass of perianal vegetations, in the second several periproctitic fistulae, in a third a recto-vaginal fistula. In all there was no evidence of syphilis but the intradermal reaction of Frei with L.I. antigen was positive. Dilatation by bougie, lavage and diathermy gave relief but no specific forms of treatment were essayed. *H. S. S.*

CAFFÉ (L.) & FULGA (Costin). La phlébite du lympogranulome inguinal bénin. [**Phlebitis in L.I.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1932. July. Vol. 14. No. 7. pp. 501–503.

In a typical Frei positive case of L.I. four weeks after the appearance of the primary lesion and three weeks after the commencement of the adenitis, when the bubo was the size of an egg but before suppuration took place, the patient suffered sudden pain in the lower limb of the same side as the adenopathy, followed immediately by oedema and swelling. The femoral vein could be felt as a hard cord, leaving little doubt that the inflammatory process had spread directly from the matted mass of groin glands to the vein. *H. S. S.*

LÖHE (H.) & ROSENFELD (H.). Neue Ergebnisse ueber die Spätformen des Lymphogranuloma inguinale (Esthiomène). [**Late Forms of L.I. (Esthiomene).**]—*Med. Klin.* 1932. Oct. 21. Vol. 28. No. 43 (1454). pp. 1486–1488. [14 refs.]

The authors believe that late manifestations of L.I. virus infections are less uncommon than was at one time supposed. They believe that genital elephantiasis or esthiomène may result from gland involvement due to sarcoma or carcinoma, tuberculosis and chancroid infections. The condition due to L.I. virus is predisposed to by a previous infection with syphilis. All their cases had had syphilis and most cases had a positive W.R. That the condition, esthiomène, is truly part of the disease they believe is proved by the following facts:—MEYER, ROSENFELD and ANDERS obtained an infection in a guineapig which could be passaged to the fourth animal with typical pathological picture by inoculation with tissue excised from such a patient. REISS has published the case of a man developing typical Frei positive L.I. who had been living, but not having intercourse, with a prostitute who suffered from esthiomène and rectal stricture. An antigen prepared by NICOLAS, FAVRE, LEBEUF and CHARPY from pus of a case of the rectal disease gave positive skin tests in L.I. patients. RAVAUT, LEVADITI, LAMBLING and CACHERA succeeded in infecting guineapigs with material from a rectal case and then passaging to a monkey by intracerebral inoculation, a monkey brain antigen giving a positive skin test in L.I. patients.

In association with SCHLOSSBERGER and KOCH further tissue was removed from the right nympha of the woman mentioned in the experiment by MEYER, ROSENFELD and ANDERS and used as inoculum into a monkey's brain. The animal developed symptoms in six weeks and died showing on post mortem examination a typical meningo-encephalitis. A brain antigen gave full positive reactions in 2 cases of L.I., mild positives in 2 other L.I. cases and negatives in 2 controls.

H. S. S.

GRIPPAIN (P.). Zur Therapie des Lymphogranuloma inguinale mit Introcid. [**Treatment of L.I. with Introcid.**]—*Muench. Med. Woch.* 1932. Sept. 16. Vol. 79. No. 38. pp. 1524–1525.

In view of disappointing results obtained by medical, surgical, radiological and vaccine methods of treatment the author has tried "Introcid," a preparation made by Desitin-Werk Carl Klinke, Hamburg and found useful in Hodgkin's disease and septic processes.

Three men with characteristic lesions and positive Frei skin reactions were given at 2–5 day intervals intravenous injections of 2–10 cc. with a total of 60cc with no general reactions. In one case gland masses the size of a fist in each groin quickly disappeared. In the other two, in which suppuration had already taken place, this treatment was combined with a small incision to evacuate the pus: the wounds healed in a short time and the infiltration cleared up rapidly. *H. S. S.*

LEVADITI (C.), RAVAUT (P.), SCHOEN (R.) & VAISMAN (A.). Réceptivité du chat à l'égard du virus lymphogranulomateux de la maladie de Nicolas et Favre. **[Receptivity of the Cat to L.I. Virus.]**—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1218–1220.

A six weeks' old kitten, inoculated intracerebrally with a brain emulsion (0·5 cc.) from a monkey which had died on the 11th day after intracerebral inoculation of a brain emulsion from a mouse killed on the 122nd day after infection with Kamm strain of virus, was killed on the 9th day while still in apparent health.

Post mortem examination revealed an intense cortical meningitis; the pia was oedematous and infiltrated with polymorphonuclear cells, lymphocytes, a few plasma cells and large mononuclears; the polymorphonuclears and lymphocytes in separate masses; in the septa masses of karyolysed polynuclear cells formed miliary abscesses; there was also perivascular infiltration with lymphocytes and large mononuclears and an intense monocytic basal meningitis with involvement of cranial nerves and roots.

A monkey inoculated with an emulsion of this kitten's brain developed the characteristic reaction. Another kitten inoculated in the same way showed nervous symptoms on the 12th day and died the following day. *H. S. S.*

JONESCO-MIHAIESTI, TUPA (A), WISMER (B.) & BADENSKI (G.). Syndrome aigu pseudo-tabétique à la suite de l'inoculation expérimentale de filtrat de lymphogranulome inguinal (Nicolas-Favre). **[Pseudo-Tabetic Syndrome following Inoculation of L.I. Virus.]**—*C. R. Acad. Sci.* 1932. Sept. 26. Vol. 195. No. 13. pp. 562–564.

An inoculum prepared from a gland, excised from a typical case of L.I., by grinding in saline with sand, filtration through paper and then passed successively through L.1. and L.2 Chamberland candles and proved sterile by ordinary tests, was injected transcranially into a *Macacus cynomolgus* monkey in dose of 5 cc. After an incubation period of 8 days the animal exhibited unsteadiness and inco-ordination followed by weakness, then complete paralysis with fibrillary twitchings —" a tetraplegia spasmodique "—and death. Post mortem examination revealed the usual changes in the brain and meninges. In the cord marked changes were found in the column of Goll, a systemization such as is seen in tabes. Degenerative changes in less degree were also present in the lateral columns and cerebellar tracts. The root ganglia and sciatic nerve showed similar infiltrative and degenerative changes but in less degree. No neurophagia was remarked such as is seen in poliomyelitis. Other animals in which this strain was passaged showed the same lesions. *H. S. S.*

FREI (W.). Zur Spezifität der Lymphogranuloma inguinale-Reaktion. **[Specificity of the L.I. Reaction.]**—*Dermat. Woch.* 1932. Oct. 29. Vol. 95. No. 44. pp. 1575–1582.

In this article, which might be read as supplementary to a previous paper by the same author (this *Bulletin*, Vol. 29, p. 731) Professor Frei returns to the question of specificity of the reaction which bears his name and treats the matter under three headings, (1) Positive reactions in cases which are not L.I. ; (2) Negative reactions in clinical cases of L.I. ; and (3) Positive reactions in L.I. patients with extraneous antigens.

Frei is more than ever convinced of the specificity of the reaction as his experience grows. He reaffirms the necessity of care in preparing antigen and in reading the result. He refers to CHEVALLIER'S case in which the use of an insufficiently heated antigen resulted in an infection. Allusion is also made to cases of latent infection without bubo which give a positive reaction.

In regard to (1) he points out that most of the false positive reactions are due to bacterial impurities in the insufficiently carefully prepared antigen and then goes on to deal specifically with the cases published by some of the Lyons workers as cases of non-specific reactions and shows the fallacies in their arguments.

That the reaction does not come off in 100 per cent. of cases of L.I. may be admitted ; as he has already pointed out in florid syphilis the reaction may be diminished or absent ; the same is true of possibly other conditions such as septicaemic processes and tuberculosis ; it is depressed sometimes in the premenstrual period and during high fever. Careful study of negative reactions is required and will probably go to enhance the value of the reaction.

Frei lays stress on the fact that L.I. patients react to all kinds of antigens more strongly than normals as a reason for rigid exclusion of other components than the specific antigenic substance from the antigen, and for this reason throws doubt upon the conclusions of WEISE and KLESTADT based upon 5 out of 7 positive reactions in L.I. patients using an antigen prepared from tissues removed from a case of elephantiasis vulvae. His opinion regarding the relationship of L.I. virus to elephantiasis vulvae is guarded.

The article should be read by everyone interested in this subject.

H. S. S.

GOTTLIEB (Filip). Neutralisation du virus de la lymphogranulomatose inguinale (maladie de Nicolas et Favre) par le sérum des malades en voie de guérison. Méthode de contrôle de l'intradermo-réaction de Frey. **[Neutralization of L.I. Virus by Serum of Recovering Patients.]**—*C. R. Soc. Biol.* 1932. Oct. 3. Vol. 111. No. 29. pp. 141–142.

Typical cases of L.I. were subjected to intradermal injections, as performed in Frei's skin test, using as inocula :—

1. An L.I. antigen prepared from pus or gland pulp—2 cases both positive.
2. The same mixed with saline—3 cases all negative.
3. A mixture of antigen and serum from healthy proved skin negative individuals—4 cases all positive.
4. Antigen and serum from L.I. patients who were recovering or had recovered from the adenitis commencing 3-6 months before—number of cases not stated but all negative.

An experiment which goes to prove that the serum of L I patients when they recover, acquires neutralizing properties against the L I antigen as used in Frei's intradermal test. *H S S*

i GOTTLIEB (Filip) Les manifestations articulaires au cours du lymphogranulome inguinal (maladie de Nicolas et Favre) [**Articular Manifestations in L.I.**] *Bull et Mém Soc Méd Hôpit de Bucarest* 1932 Oct Vol 14 No 8 pp 549–554

ii LIEBREICH (E) & GOTTLIEB (F) Lymphogranulome inguinal (maladie de Nicolas et Favre) accompagné d'arthrite, épisclérite et manifestations cutanées sous l'aspect d'érythème polymorphe Cas de contagion conjugale [**Arthritis, Episcleritis, and Skin Eruption in L.I. A Case of Conjugal Infection.**]—*Ibid* pp 554–561 With 2 figs

i The record of an L I infection, with intra-urethral primary lesion and a minor degree of adenopathy, but followed by marked swelling of one knee and pain also in elbows and wrists, thus resembling cases of L I associated with arthritis previously published by other authors The author had had altogether 5 cases of arthritis among 48 patients

ii The record of a conjugal L I infection The husband suffered a mild attack with primary sore and double inguinal adenitis, which cleared up in four months His wife, whom he infected, was ill for eight months with double-sided bubo, multiple fistulae, marked general symptoms, muscular and articular pains, a polymorphous erythematous eruption on the forearms arms, neck, trunk and lower limbs each advance being accompanied by an exacerbation of pains and swelling in knees and feet and attacks of episcleritis W R negative , gonorrhoea negative , Frei test positive *H S S*

REISS (Franklin) Zur Frage der Infektiositat des sogen genito-rectalen Syndroms als Spatfolge des Lymphogranuloma inguinale [**Infectivity of the Genito-Rectal Syndrome in Later Stages of L.I.**]—*Klin Woch* 1932 Dec 3 Vol 11 No 49 pp 2031–2032

Report of a case of a man 54 years old who developed Lymphogranuloma inguinale with a primary penile lesion He had been living with a woman formerly a prostitute who was suffering from esthiomene and inflammatory stricture of the rectum Both denied intercourse for two years past

In the man Frei reaction positive , W R negative , Dmelcos reaction negative In the woman Frei reaction positive , Dmelcos reaction negative , W R negative The man had had gonorrhoea in the past , the woman had had gonorrhoea and syphilis in 1926, chancroid in 1927 and a bubo, 1928 gonorrhoea and chancroid at the anus (?), arthritis and pyelitis Symptoms of rectal stricture began in 1927 *H S S*

ZAKON (S J) Lymphogranulomatosis Inguinalis or Durand-Nicolas-Favre Disease [**L.I. A Review of the Literature.**]—*Arch Dermat & Syph* 1932 Aug Vol 26 No 2 pp 238–249 With 4 figs (3 coloured on 2 plates) [30 refs]

After a brief review of some of the literature the author gives notes of three cases seen while on a visit to Vienna The article contains no new facts and was apparently written before the demonstration by HELLERSTRÖM and WASSEN of the presence of an ultra-microscopic virus *H S S.*

REVIEWS AND NOTICES.

MORISON (J.) [C.I.E., M.B., D.P.H., etc.]. **Bacteriophage in the Treatment and Prevention of Cholera.**—32 pp. With 27 figs. on 14 plates & 4 graphs. 1932. London: H. K. Lewis & Co. Ltd. [4s.]

Although the subject matter of this booklet deals specially with the preventive and curative treatment of cholera, it also sets out in an admirably clear manner some of the more theoretical and experimental aspects of the bacteriophage problem. No one will now deny the importance of the subject and its intimate connexion with bacteriology. The chemistry and architecture of the bacterium, the differentiation of bacterial species, recovery from and immunity to bacterial infection, chronicity of disease, the ebb and flow of epidemics, all these even to the very nature of living matter itself, are in one way or another bound up with the nature and activity of the bacteriophage. One of the most important chapters of the book is on the types of bacteriophage. D'HERELLE divided his bacteriophages into races and used this word for bacteriophages to avoid confusion with bacteria, for which the corresponding word "strain" was employed. "Races," says Morison, "in the present state of our knowledge are specific for certain bacteria or for allied groups of bacteria." Races are subdivided into types and these again into sub-types. The first three types of cholera phage differentiated by ASHESHOV were named A, B and C. Morison and his co-workers have carried the alphabetical nomenclature as far as J. Perhaps the doubt that Z might be reached without the attainment of finality has been responsible for the mathematical expression of the mode of typing. With the isolation of more and more types the method has been evolved of employing strains of cholera vibrios made resistant to then known types, taken (n—1) at a time, for diagnosis. Add to these, for the detection of a new type, a strain made resistant to all the n types, and we have a total of (n+1) types. An important discovery for phage therapy with regard to types of bacteriophage is that natural mixtures of types are much more stable than the simple admixture of isolated pure types. The illustrations accompanying the dissertation on types of phage are numerous and excellent and give us all that is required for the understanding of the method of their isolation from a mixture. In his early work Morison obtained a combined bacteriophage which showed activity for both cholera and dysentery organisms. This is a particularly useful combination and especially where the two diseases are liable to occur concomitantly or even, as at El Tor, to be mistaken in the first instance the one for the other.

The conclusion has been reached that an efficient therapeutic phage must be of multi-type and should be maintained for use as nearly in its natural condition as possible. Such bacteriophages are "sought from as many patients as possible and from many samples of sewage."

Morison's observations, unfortunately only too short, on the subject of transmutation of cholera into cholera like organisms are very interesting. "The bacteriophage," he says, "has something to do with the production of rough from smooth strains and *vice versa*. But we have so far been unable in the case of cholera to make agglutinable vibrios inagglutinable by growing them in the presence of bacteriophage. We have further been unable to transform true cholera into 'cholera-like" vibrios . . under conditions that precluded contamination."

An original and noteworthy explanation of the natural history of epidemics of cholera in Assam is well deserving of attention. The fly-menace as a disseminator of cholera infection is summarily dismissed. Epidemic cholera in this province is a phenomenon of dying rivers and of the onset of monsoon rains, or at least of the rise of rivers. The dry, natural-latrine banks are washed over and the infection passes down stream to lower villages. This occurs in the first instance as a result of the melting of the Himalayan snows. The valley becomes infected and cholera breaks out.

Not only are we interested in this description of natural infection by the cholera organism but with the next phase which perhaps d'HERELLE would have called contamination with bacteriophage and subsidence of the epidemic. One might almost have expected to find that the bacteriophage derived from convalescent cholera cases, would have been transported by the swollen river to lower regions and so would bring epidemic conditions to an end by a water-borne agency. Apparently, however, the fall in cholera during July and August has been ascribed rather to dilution of the infection. It would seem also that this latter is not the author's own view. He is inclined to consider that "what brings cholera to a low ebb is the complete isolation of one village from another which is effected by the rain and the mud."

One more reference may be made to the important doctrinal matter contained in this essay. India is a land peculiarly suited to large scale trials and we await with interest the completion of the trial of bacteriophage, curatively for early cases of cholera and, by implication, prophylactically for the following epidemic. The district in Assam selected for test "has been free from cholera for a period twice as long as any during the last ten years." The graph given shows how striking is this immunity by contrast with the control district. Would that a control more closely resembling that of the alternate case type could have been instituted! "We are entering, however, the fifth year since the last outbreak. Russell's periodic year for cholera in Assam. We have a population that is neither protected by recent cholera nor by vaccination. Until 1932 has passed we cannot be quite certain." The trial therefore is a crucial one and especially so in 1932; it should, if it is convincing, go far to establish the usefulness not only of such trials but also of the forecasts which are now regularly made in respect of epidemic diseases in India.

W. J. Harvey.

VENEZUELA. **Estados Unidos de Venezuela.—Ministerio de Salubridad y de Agricultura y Cria. Conferencia Sanitaria Nacional de 1931.** [National Health Conference, Venezuela, 1931.]—691 pp. With numerous illustrations. 1932. Caracas: Tipografia Americana.

This volume is a full report of the proceedings of the Health Conference of Venezuela which took place in December 1931 and is devoted especially to the question of malaria in Venezuela. There is much interesting information scattered through its pages but at the same time the articles do not permit of abstracting. In fact, the report would, we think, be of greater ultimate value if judicious editing excluded unimportant and redundant matter. The report consists of five parts. The first records the official opening and closing, with the speeches delivered. The second comprises the bulk of the volume and contains the numerous reports from the various officials telling of the conditions in their several districts which influence the prevalence of malaria. In this are many excellent illustrations of the "beautiful hatcheries" (hermoso criadero) for mosquitoes which seem to abound. Part III is a copy of the correspondence sent to the head office. Part IV is the statistical section, but the returns are too subdivided already to be abstracted, and are mainly of local interest. The final section reproduces the minutes of the sessions and the resolutions passed.

H. H. S.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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RABIES

A REVIEW OF RECENT ARTICLES XVIII *

1 *Virus*

KRAUS and DURAN[1] in continuation of their communication on " mal de caderas ' in South America, summarize the work of PATTO, HURST and PAWAN REHAAG and CARINI, etc These have already been discussed in this *Bulletin*, Vol 29, pp 595–597 They suggest that a better name than " mal de caderas would be " South American lyssa in cattle

In a second communication[2] they deal more fully with the results of their examination of the Trinidad virus of HURST and PAWAN In their experience the paralysis induced in rabbits is not characteristic of street virus rabies It commences invariably with affection of the fore extremities and is followed by trismus exaggerated reflexes, paralysis and death in one or two days The clinical picture in guineapigs is similarly unusual A kerato conjunctivitis with oxyphil inclusions is also a feature of inoculation with the Trinidad virus This has not previously been observed by the authors in the case of street virus fixed virus Sassari virus, South American cattle virus or the virus of "chien fou For these reasons the authors are dissatisfied with the evidence supporting the identity of the Trinidad strain with rabies virus A definite decision must rest upon a quantitative rather than a qualitative basis, as it is well known that close biological relationships exist between the various types of filtrable viruses Until stronger evidence is available the authors prefer to consider the Trinidad disease as a variety of rabies (Paralyssa)

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* For the seventeenth of this series see Vol 29 pp 595–608

[1] KRAUS (R) & DURAN (A) Nachtrag zur Arbeit ueber die in Sudamerika vorkommenden Epidemien der Hundswut bei Rindern und Pferden — *Ztschr f Immunitatsf u Experim Therap* 1932 Vol 75 No 3/4 pp 363–365

[2] KRAUS (R) & DURAN (Agustin) Ueber Varietäten der Lyssa Ueber eine besondere Form der Hundswut beim Menschen auf der Insel Trinidad und ueber die Zugehörigkeit zur klassischen Form der Lyssa II Mitteilung —*Ztschr f Immunitatsf u Experim Therap* 1932 Vol 76 No 3/4 pp 285–296 With 8 text figs & 1 coloured fig on plate facing p 354

In continuation of their former work (this *Bulletin*, Vol. 24, p. 760) LEVADITI, SCHOEN, and MEZGER[3] put forward further evidence in favour of the view that the virus of rabies is an organism of the microsporidion type (*Glugea lyssae*)*. They state that in rabid mice the development of the virus may either be (1) by grouping—in which case the initial free granulations coalesce to form plaques (Negri bodies)—or (2) by dispersion—in which case the neurones become filled with round, oval, or piriform corpuscles. They believe that the diverse oxyphil formations observed in these experimentally infected mice are specific, are intimately related to the multiplication of the virus in the nerve cell, and that they represent the almost ultra microscopic spores of *Glugea lyssae*. From experiments of which the results are given in the form of diagrammatic tables they conclude that the pathogenic activity of the brain is zero or very feeble if oxyphil formations are absent, and that, as the formations augment in quantity and in volume, the degree of virulence increases.

As the result of further histological study LEVADITI[4] concludes that the oxyphil formations found in the spaces between the Nissl corpuscles, are not related to mitochondria. The staining reactions of the two formations are quite different. They believe that the formations are colonies of rabies " germs " developed in contact with chondria, or in the canaliculi of the vacuole system.

A further communication by the same authors[5] deals with differences in the cycle of evolution of rabies virus of different strains. In some, " grouping " (see above) predominates, in others " dispersion " is the more marked. These differences depend upon the strain of virus, the species of animal inoculated, and the type of neurone affected. They also confirm the conclusion reported in the former paragraph, that though one cannot identify the rabies corpuscles (elementary or cystic) with the mitochondrial apparatus, nor with the vacuole system of the neurones, yet their results appear to show that " the units of the rabies germ multiply in contact with the chondria which serve as a culture medium and become modified in staining affinities." The variation in number or character of chondria in different neurones, and in different species of animals explains the differences referred to above.

In a fourth paper[6] they refer to their previous conclusion (this *Bulletin*, Vol. 24, p. 760) that fixed virus is a mutation of *Glugea lyssae* characterized by the loss of the faculty of the microsporidion to accomplish the pansporoblastic phase of its cycle of evolution (the Negri body). Experiments on dogs and on monkeys lead them to the conclusion that this mutation is irreversible, or at least " difficultly reversible."

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* Erroneously described in this *Bulletin* as *Glygea lyssae*.

[3] LEVADITI (C.), SCHOEN (R.) & MEZGER (J. G.). Etude morphologique du virus rabique.—*Bull. Acad. Méd.* 1932. June 7. 96th Year. 3rd Ser. Vol. 107. No. 22. pp. 782–793. With 8 text figs. [Refs in footnotes.]

[4] LEVADITI (C.) Recherches sur la morphologie du virus rabique.—*C. R. Soc. Biol.* 1932. July 11. Vol. 110. No. 24. pp. 771–772.

[5] LEVADITI (C.), SCHOEN (R.) & MEZGER (J. G.). Morphologie du virus rabique. —*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1215–1216.

[6] LEVADITI (C.), SCHOEN (R.) & MEZGER (J. G.). L'irréversibilité de la mutation du virus rabique des rues en virus fixe.—*C. R. Soc. Biol.* 1932. June 3. Vol. 110. No. 19. pp. 274–277. With 2 text figs.

In an article which should be studied by all interested in the pathological aspects of rabies, MARINESCO and STROESCO[7] examine the problems of the transmission of neurotropic ultra viruses (in particular that of rabies) and the nature of the pathological appearances in the nervous system. While not denying transmission along the axis cylinder, they favour the view that transmission is along the lymphatic spaces. Transmission depends upon various factors, " odogenesis," (*i.e.*, perivascular cell infiltration), the pH of the tissues, and differences in the potential of oxydo-reduction. These factors account for the peculiar characteristics of the various viruses—their cyto- and karyotropism—and bring about by their interaction the lesions observed in the nerve cells, and Negri bodies. The oxydase ferments of the cells of the spinal ganglia are destroyed in part, their nuclei degenerate as a result of the alteration in their catalysts, and in them no Negri bodies are found. They believe that the latter arise as the result of an " exciting " action of the virus on the nucleoli which causes the production of oxyphil granulations, which, under electro-chemical influences, traverse the nuclear membrane, and give rise to the characteristic appearances of the corpuscles of Negri thus supporting the view of ACTON and HARVEY (*Parasitology*, 1911, Vol. 4, page 255). The oxyphil substance imprisons the virus, and is essentially a rampart of cytoplasm which protects the cell against the noxious action of the ultra virus. They believe that the Negri body, which does not contain chromatin, cannot be regarded as protozoal in character since in the structure of true parasites of this type the reactions of Fuelgen and of Macallum, which demonstrate nuclear origin by detecting the presence of thymo nucleic acid, are always positive, whereas in the case of Negri bodies they are invariably negative. They conclude that the corpuscles of Negri cannot be regarded as the visible pansporoblastic phase of rabies.

A conclusion against protozoal origin is also reached by COVELL and DANKS[8]. From examination by dark field illumination of Negri bodies in the living state they find no evidence of a limiting membrane, nor of granular movements. Macallum, Fuelgen, and Millon reactions in their hands were variable and were less in favour of protozoal origin than of the origin of the inner bodies from extruded basophilic nuclear chromatin and Nissl substance. The contention that the bodies arise from constituents already present in the nerve cell as a result of the action of the virus is in agreement with their findings, but they consider the evidence for the participation of mitochondria, neurofibrils and nucleolus as inconclusive. "Both the Negri bodies and the smaller atypical lyssa bodies are probably formed by alterations in the basophilic Nissl substance, the fundamental ground substance of the cell, and by addition of variable amounts of basophilic material of nuclear origin. There is no evidence that organisms on the borderline of microscopic visibility are cloaked with these cellular components in accordance with the chlamydozoal hypothesis."

[Until the results of the Fuelgen and Macallum reactions are definitely established the question must remain in suspense.]

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[7] MARINESCO (G.) & STROESCO (G.). Études sur la pathologie de la rage.—*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1931. Sept.–Dec. Vol. 4. No. 3/4 pp 243–288. With 32 coloured figs. on 1 folding plate.

[8] COVELL (W. P.) & DANKS (W. B. C.) Studies on the Nature of the Negri Body.—*Amer. Jl. Path.* 1932. Sept Vol. 8. No. 5. pp. 557–572. With 8 figs. on 2 plates [23 refs]

JONNESCO[9] has carried to a further stage his researches on rabies in the hedgehog He finds that during hibernation its resistance to the virus is very high, that injections with fixed virus produce Negri bodies if the incubation period is longer than 8 days, and that these persist from passage to passage He has observed two cases in which Negri bodies were present, but the disease could not be transmitted to rabbits—"infection mortelle auto-sterisable" When fixed virus from the hedgehog is inoculated into dogs or rabbits, Negri bodies are found, but these disappear after 3 to 5 successive passages He believes that fixed virus inoculated into hedgehogs, acquires, in part, the character of street virus, showing that the mutation of street virus into fixed virus is not absolutely irreversible

NICOLAU, MATHIS and CONSTANTINESCO[10] discuss in greater detail the effect of subpassage on a strain of virus of Oulou-Fato (this *Bulletin*, Vol 29, p 597)

A strain of street virus of exalted virulence is described by JONNESCO[11],[12] It originated from a Rumanian wolf, and in its first 19 passages through rabbits caused rabies with a constant incubation period of 3 days, followed by paralytic symptoms which resulted in death in from 1 to 3 days Negri bodies could not be found in the brains of any of the rabbits inoculated In the guineapig the incubation period was 2 days The strain, when inoculated subcutaneously into 20 white mice, produced paralysis in 17 instances in 3 days, in two instances in 4 days, and in one instance in 7 days In 12 dogs inoculated serially by the subdural route, paralysis developed in 2 or 3 days In the brain of the dog of the eighth passage a few Negri bodies were found Three young cocks were infected, showing paralysis on the 16th, 17th and 19th days respectively In their brains a few Negri bodies were found Crossed immunity experiments proved that the virus was one of true rabies

The characteristics of the strain of fixed virus in use at Tunis have been examined by BALOZET[13] The strain emanated from Paris and is now in its 1350th passage The period in the case of rabbits from time of inoculation to time of death has fallen from 12 days in 1902, to 5¾ days in 1931, whilst the incubation period has fallen from 7 days to 4½ days The strain has also become more sensitive to desiccation, whilst the Paris virus loses virulence after 6 or 7 days, that of Tunis loses virulence in 3 days The strain has not, however, lost pathogenicity

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[9] JONNESCO (Demetre) Recherches sur la reversibilité du virus rabique fixe —*Ann Inst Pasteur* 1932 June Vol 48 No 6 pp 735–743

[10] NICOLAU (S) MATHIS (C) & CONSTANTINESCO (Val) Sur la transformation en virus fixe d une souche particulière de virus rabique des rues —*C R Soc Biol* 1932 June 17 Vol 110 No 21 pp 433–435 With 2 text figs

[11] JONNESCO (Démètre) Sur un virus rabique des rues à virulence renforcée —*Bull Acad Méd* 1932 May 24 96th Year 3rd Ser Vol 107 No 20 pp 688–689

[12] JONNESCO (Démètre) Recherches sur un virus rabique de rue à virulence renforcée—*Ann Inst Pasteur* 1932 Oct Vol 49 No 4 pp 435–444 [16 refs]

[13] BALOZET (L) Le virus rabique fixe de l'Institut Pasteur de Tunis, évolution et état actuel—*Arch Inst Pasteur de Tunis* 1932 July Vol 21 No 1 pp 130–143 With 1 chart [15 refs]

Remlinger and **Bailly**[14] from an examination of statistics of animal inoculation conclude that the virus of rabies as it occurs in Morocco does not differ in any way from that of western Europe.

ii. *Symptomatology.*

Fetherston and **Cooper**[15] relate the case of a man, bitten on the hand, who developed rabies after a month. He had not been treated, and on his demise 7 other men bitten on the hands by the same dog presented themselves for treatment. One of these died on the next day, two days later a second developed symptoms, and again two days later a third contracted the disease. In all four cases the diagnosis was established by the presence of Negri bodies. Thus four out of the eight contracted rabies, although in no case was there severe wounding. The incubation periods were approximately 29, 30, 32 and 34 days.

iii. *Diagnosis.*

It has for long been believed that intravenous injection is not a satisfactory method of experimental infection. **Jowelew** (this *Bulletin*, Vol. 28, p. 746) stated that positive results could be obtained when the haemato-encephalic barrier was broken down by lumbar puncture and pumping. **Schweinburg**[16] from an exhaustive experimental study finds that this is not necessary in the case of guineapig infection. He has succeeded in infecting 90 per cent. of these by inoculating sufficiently large quantities of a rather thick emulsion freed by filtration from the larger sized particles. A large dose is necessary, as histological examination shows that much of the emulsion is trapped in the vessels of the lung. He believes that the doses used by **Jowelew** were too small, and recommends doses of 6 cc. per kilo. Intravenous infection following this procedure is as certain as intramuscular, but not so certain as cerebral, subdural or intraocular administration.

iv. *Pathology.*

The presence of rabies virus in the lachrymal gland has been investigated by **Tscheschkow**.[17] In the case of 10 dogs infected experimentally with street virus a positive result was observed in 9 instances. In 4 out of 10 passage rabbits (fixed virus) a positive result was obtained, and in 3 out of 3 fatal human cases inoculation of an emulsion of the gland into rabbits caused rabies.

In accordance with the view of **Manouèlian** and **Viala** that the infectivity of secretions from glands depends upon the presence of nerve cells shed into them, it is reasonable to expect that the milk of infected animals would on occasion prove infective. **Remlinger** and **Bailly**[18] have put this to the test in the case of 7 guineapigs, 4 cats, and one dog. Inoculations were carried out 4 times with gland tissue, and 39 times with milk Two positive results have been obtained, one with an emulsion of gland and the other with milk

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[14] **Remlinger** (P.) & **Bailly** (J.) La rage et le virus rabique au Maroc.—*Arch. Inst. Pasteur d'Algérie.* 1932 Sept. Vol. 10. No. 3. pp. 429–435.

[15] **Fetherston** (J E.) & **Cooper** (George F.). Rabies. Report of Four Deaths resulting from Bites on the Fingers by the Same Rabid Animal.—*U. S. Nav. Med. Bull.* 1932. July. Vol. 30. No. 3. pp 314–321.

[16] **Schweinburg** (Fritz). Versuche ueber intravenöse Lyssainfektion.—*Zent. f. Bakt.* I. Abt. Orig. 1932. June 10. Vol. 124. No. 7/8. pp. 426–453. [28 refs.]

[17] **Tscheschkow** (A. M) Ueber die Bedingungen des Eindringens von Tollwutvirus in die Tränendrüsen —*Ztschr. f. d Gesamte Experim. Med.* 1931. Vol. 78. pp. 142–146. [10 refs]

[18] **Remlinger** (P.) & **Bailly** (J.). Contribution à l'étude du passage du virus rabique dans le lait.—*C. R. Soc. Biol.* 1932. June 3. Vol. 110. No. 19. pp. 239–241.

PLANTUREUX and HILBERT[19] report a case in which they believe that transmission took place through the placenta A pup developed rabies 19 days after its birth from a bitch which died of rabies on the day of parturition On account of the short incubation period they think it more logical to consider that infection took place through the placenta, than from the saliva of the mother

A research carried out in collaboration with VIALA (this *Bulletin,* Vol 28, p 246) has been extended by NICOLAU and KOPCIOWSKA [20] It will be remembered that they failed to find evidence of the presence of fixed virus in the brains of rabbits which had received Pasteurian treatment Of 54 rabbits inoculated subdurally with emulsions of the vaccinated animals four have died, and in each case subpassages have been negative The histological changes in the vaccinated animals have already been described (*loc cit*, Vol 29, p 601) In the brains of the four passage animals which died, they observe "plaques of mononuclear meningitis," glial proliferation, mononuclear infiltration between the ganglion cells of the pyriform lobe, and evidences of chronic "perivascularity" The cause of these deaths is uncertain They may be similar to those described by REMLINGER and BAILLY (*loc cit*, p 599)

In an earlier paper (this *Bulletin,* Vol 28, p 745) LOEFFLER and SCHWEINBURG showed that the theory that rabies antibodies were produced in the brain as a consequence of stimulation by fixed virus which had penetrated into it, was untenable They were of opinion that the antibodies were formed elsewhere In the present communication[21] they present evidence indicating that the seat of origin is the reticulo-endothelial system By blocking this system with Indian ink particles they find that blocked animals are protected to a lesser degree than unblocked controls, and that the serum of animals which have been blocked is less viricidal For example, of 8 rabbits (blocked as above) all succumbed to a test dose of fixed virus, whilst of eight unblocked controls, two developed rabies

v *Methods of Treatment and Statistics*

The second analytical review by McKENDRICK[22] of statistics from Pasteur Institutes on the results of antirabies treatment undertaken by the Health Section of the League of Nations, at the instance of the Rabies Conference (Paris 1927), has now been published. It deals with the data regarding 67,707 treated persons, and relates mainly to the year 1929

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[19] PLANTUREUX (E) & HILBERT (D N) Au sujet d un cas de rage chez un chiot de 19 jours —*Arch Inst Pasteur d Algérie* 1932 Mar Vol 10 No 1 p 40

[20] NICOLAU (S) & KOPCIOWSKA (L) Le virus fixe existe t il dans le névraxe des lapins qui subissent la vaccination antirabique ?—*C R Soc Biol* 1932 June 10 Vol 110 No 20 pp 348–352 With 2 text figs

[21] LÖFFLER (Ernst) & SCHWEINBURG (Fritz) Zur Theorie der Immunität bei Tollwut (Zweite Mitteilung) —*Virchows Arch f Path Anat u Physiol* 1932 Feb 5 Vol 283 No 2 pp 540–549 [30 refs]

[22] McKENDRICK (A G) A Second Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment —*Quart Bull Health Organisation League of Nations* Geneva * 1932 Mar Vol 1 No 1 pp 110–141

"The figures again bring into prominence the fact that the non-European is at a much higher degree of risk than the European. They also show that the non-European is, on the average, more severely bitten than the European; that he is more frequently bitten on the bare skin; that he does not commence treatment so early; and that the animal which bit him is more frequently rabid. It has not been possible from the figures to find any indication of the existence of a racial susceptibility to rabies.

"As in the former review, no decisive evidence has been found, apart from liability to post-vaccinal paralyses, of the superiority of any one of the various methods of treatment which have been employed. Within the European group, the differences between the death rates of the various institutes are not greater than would be expected as the result of chance variations. A similar statement is also true with regard to the non-European group, but it is not true with regard to the whole statistics embracing the two groups.

"It is, however, to be noted that the statistics as submitted indicate a probable advantage in favour of modified dilution methods of treatment as compared with the others. As pointed out earlier in this review, further analysis demonstrates the presence of factors which partly account for the figures, apart from intrinsic superiority of the method; but, when all allowance is made for these factors, there appears to remain a certain amount of evidence in favour of this method as compared with the others. It should be emphasized, however, that the validity of such a conclusion depends entirely on the assumption that no unknown circumstances of importance are operating which might influence the figures decisively in favour of the method."

[A third review is at present in the press, and in it the apparent advantage in favour of dilution methods is not confirmed.]

The proportion of accidents after treatment by dried or glycerinated cords is much lower than was found in the previous review, but is still much greater than after treatment by killed vaccines.

Statistics of treatment at Sassari by FERMI are treated separately in an appendix. During the period 1900–1907, 700 persons of whom 2 developed rabies, were treated by the dried cord method. "These two individuals [who died] were both deeply bitten on the bare skin of the head, and in both cases treatment was not commenced until the 3rd week after the bite had been inflicted. From 1907 onwards [to 1930], 3,974 persons have been treated by FERMI's sero-vaccine, and, during this period, no cases of rabies have been observed."

A comparison of the protecting power of treatment by living fixed virus, carbolized fixed virus, and etherized fixed virus on groups each consisting of 12 rabbits, has been made by STUART and KRIKORIAN.[23] Of those treated by living fixed virus 42 per cent. survived a subdural test dose; of those treated by carbolized fixed virus 42 per cent survived; of those treated by ether fixed virus 50 per cent. survived, as compared with none out of three control animals. The results are not significantly different. The rabicidal properties of the sera of animals treated by the 3 methods reached maxima in 60 days, of 1 to 16 in the case of living virus, 1 to 8 in the case of carbolized fixed virus, and 1 to 24 in the case of ether fixed virus. That is to say the relative efficacies were in the proportions 2 · 1 3 The authors conclude from these two sets of observations that no mathematical relationship can be established between protection and rabicidal antibody content

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[23] STUART (G.) & KRIKORIAN (K. S.). The Rabicidal Antibody Content of Rabbit Immune Serum as an Index of Acquired Resistance to Rabies Infection.—*Jl. Hygiene.* 1932. Oct. Vol. 32. No. 4. pp. 489–493.

In the belief that the failure of treatment by antirabic sera, even of very high titre, when given either before or at the moment of infection, may be ascribed to lack of penetration of the serum into the brain substance, LOFFLER and SCHWEINBURG[24] have investigated the effect of breaking down the haemato-encephalic barrier by means of Theocin (This method, due to FROLICH and ZAK, has been used with success in the case of tetanus and diphtheria) Eighteen rabbits were given three intravenous injections of Theocin (Theophyllin sodium acetate 3 per cent, 4 cc per kilo of body weight), and after half an hour 3 cc a high titre rabicidal serum All were protected against a subsequent infective dose of rabies virus The effect is similar to that described by SPERANSKY (this *Bulletin*, Vol 24, p 764), though the procedure is different

In a further series of experiments by removing cerebro-spinal fluid by occipital puncture and introducing rabicidal serum by the same route they were able to protect animals which had been infected a short time previously (eighteen hours after cerebral infection) These investigations are being extended and will form the subject of a future publication

The effect of sparteine on the virus of rabies has been investigated by REMLINGER and BAILLY[25] In a first series of experiments the effect *in vitro* was examined Of 20 animals inoculated with virus-sparteine mixtures, 4 developed rabies whilst of 14 inoculated with virus alone 12 died From experiments with mixtures variously treated they conclude that the action of sparteine is not that of an antiseptic In a second series the action *in vivo* was studied In these sparteine solution was injected into animals, which received immediately thereafter a test dose of rabies virus Of 55 animals treated with sparteine 29 died of rabies, whilst of 34 control animals 33 developed rabies It was also shown that the protection conferred was proportional to the quantity of sparteine administered, but that the site of infection—into brain, or into subcutaneous tissue—had no influence It appeared from these experiments that the guineapig is the most suitable animal to bring into evidence the phylactic action of sparteine

In a second paper REMLINGER and BAILLY[26] show that the inoculation of sparteine after the rabies virus had been introduced had no phylactic action, and consequently that the phylactic (or neutralizing) action of sparteine cannot be applied to the treatment of rabies

On the analogy that chloroform is stated to have the effect of promoting the action of anti-tetanic serum by weakening the hold of the toxins on the lipoids of the nerve cell and thus facilitating the combination between toxin and antitoxin, KING[27] suggests that the action of antirabic sera in conjunction with chloroform administration should be investigated

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[24] LÖFFLER (Ernst) & SCHWEINBURG (Fritz) Rabicides Serum im Tierversuch —*Wien Klin Woch* 1932 June 24 Vol 45 No 26 pp 813 814

[25] REMLINGER (P) & BAILLY (J) Phylaxie et virus rabique —*C R Soc Biol* 1932 May 27 Vol 110 No 18 pp 159–161

[26] REMLINGER (P) & BAILLY (J) La spartéine inoculée apres le virus rabique n exerce aucune action phylactique —*C R Soc Biol* 1932 July 1 Vol 110 No 23 pp 674–676

[27] KING (H H) The Treatment of Hydrophobia [Correspondence]—*Indian Med Gaz* 1932 June Vol 67 No 6 pp 357–358

REPETTO[28] reports that antirabic treatment is now carried out in the case of " numerous " persons bitten by suspected animals at Leopoldville (Belgian Congo) by the method of Fermi (See also this *Bulletin*, Vol 22, p 703)

Antirabic treatment was commenced in South Carolina in 1909. SMITH[29] reports that during the period from July 1909 to October 1931, 13,849 persons have been treated, of whom 27 died of rabies From 1909 to 1927 the dried cord method was employed in the case of 651 patients of whom 11 died (mortality rate 0 66 per cent) From 1917 to 1922, phenolized dilutions (suspension of 1 in 1,000, in 0 5 phenolized salt solution 21 doses of 2 5 cc) were administered to 6,988 persons, of whom 15 died (mortality rate 0·21 per cent) From 1927 to 1931 stronger dilutions (1 in 500 in 0 3 phenolized salt solution in the same dosage) were given to 4 738 patients of whom only 1 died (mortality rate 0 021 per cent) No paralytic accidents have been observed throughout the 3 periods

OUCHAKOV[30] reports that during the year 1931, 1,241 persons were treated at Leningrad of whom one developed rabies (0 1 per cent) The vaccine employed was that of Fermi 2,283 persons were treated at out-stations of whom 4 died (0 2 per cent)

From Calcutta NICHOLAS[31] reports that during the year 1930, 6,958 persons were treated of whom 42 died (0 61 per cent) 294 of these were European and amongst these no deaths occurred Of the Indians who numbered 6,664 42 died (0 63 per cent) It is stated that completed health returns were received in respect of 78 3 per cent of those treated

MURAT[32] from figures relating to persons treated in Algiers from 1894 to date, states that of 48,018 persons 188 died, that is a mortality rate of 0 39 per cent When these are subdivided into race groups it appears that of 32,519 Europeans 71 died (0·22 per cent) whereas of 15 499 of indigenous birth 117 died (0 75 per cent)

vi *Rabies in Animals*

REMLINGER and BAILLY[33] have already shown that the virus of rabies may persist in the brain of the tortoise (*Testudo mauritanica*) for a period of 302 days (this *Bulletin*, Vol 29, p 194) They now find, from experiments on 12 fresh water tortoises (*Clemmys leprosa*), a similar period of persistence of not less than 150 days. Neither species exhibits any symptom of rabies.

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[28] REPETTO (R) A propos de l existence de la rage au Congo Belge —*Ann Soc Belge de Med Trop* 1932 June 30 Vol 12 No 2 pp 147 151 [15 refs]

[29] SMITH (H M) Experience with Rabies and its Preventive Treatment in South Carolina —*Southern Med Jl* 1932 Aug Vol 25 No 8 pp 876–879

[30] OUCHAKOV (V) Rapport annuel par l année 1931 Service antirabique de l Institut de Médecine Expérimentale (Léningrad) —*Arch Sci Biol* 1932 Vol 32 No 4 [In Russian pp 251–261 French summary p 262]

[31] CALCUTTA Seventh Annual Report of the Pasteur Institute Calcutta for the Year 1930 [NICHOLAS (M J) Superintendent] —29 pp 1932 Calcutta Bengal Secretariat Book Depot [8 annas 9d]

[32] MURAT (H) De la rage en milieu indigene et en milieu européen en Algerie —*Arch Inst Pasteur d Algerie* 1932 Sept Vol 10 No 3 pp 436–437

[33] REMLINGER (P) & BAILLY (J) Sur la longue persistance du virus rabique dans l encéphale de la tortue d'eau douce (*Clemmys leprosa*) —*C R Soc Biol* 1932 June 17 Vol 110 No 21 pp 421–423

MEZGER[34] from two series of experiments confirms the above, and earlier results of REMLINGER and BAILLY. They have found the virus in the brain of *Testudo mauritanica* 26 days, and in *Cynixys belliana* 115 days after inoculation. They have never seen Negri bodies in the nerve cells.

GREVAL[35] has found Negri bodies in the brain of a mongoose which was suspected of rabies. He also reports a case of death from rabies in which the biting animal was presumably a mongoose. The relation of the mongoose to rabies epizootics is discussed (see also this *Bulletin* Vol. 28, pp. 742–743).

A case of rabies in a dog which exhibited symptoms of haemorrhagic gastro enteritis is related by ANANIADÈS and ANTONIADÈS.[36]

JAMES[37] describes a case of rabies in a horse in which the incubation period was estimated at more than sixteen months, whilst the course of the disease was under 36 hours.

TEBOULLE[38] describes rabies in the dog, and the methods of prevention employed in Alexandria.

RECORDS[39] reports that rabies reached the state of Nevada in 1915 by way of Southern California, and thereafter spread rapidly, constituting a menace to livestock and to the human community. Action was taken to reduce the number of predatory animals. A total of 99,183 of these has been destroyed between 1915 and 1930. The brains of 1,085 were examined, and 583 were found to be positive. The percentage of positives is on the decrease.

Ether virus, prepared according to the method of REMLINGER and BAILLY, has been used in the preventive inoculation of dogs in Tunis,[40] during a period of 6 months. A total of 304 have been inoculated, and of these four have died, one from rabies. In the latter case the fatal outcome cannot be ascribed to the vaccination, as the animal died 8 days after receiving treatment.

JONNESCO[41] repeats an observation, which has frequently been made, that street virus can be fixed by passage from dog to dog. After 12 sub-passages Negri bodies had disappeared, and after 85 passages the incubation period became fixed at 7 days. This dog fixed virus is effective in the immunization of dogs and is said to be superior to rabbit fixed virus.

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[34] MEZGER (J G) La conservation du virus rabique dans le cerveau de la tortue (*Testudo mauritanica* et *Cynixys belliana*) —*C R Soc Biol* 1932 Aug 12 Vol. 110 No 28. pp 1292–1294

[35] GREVAL (S D S) Rabies in the Mongoose (Reports from Records, including a Report on the First Positive Brain of Mongoose examined at Kasauli Comments including Speculation and Bearing on Treatment)—*Indian Med Gaz* 1932 Aug. Vol 67 No 8 pp 451–453

[36] ANANIADÈS (B) & ANTONIADÈS (C). Syndrome gastro-intestinal de la rage chez un chien —*Rev Gén de Méd. Vet* 1932 June 15 Vol 41 No 486 pp 331–332.

[37] JAMES (Allan J) An Atypical Case of Rabies —*West African Med Jl.* 1932 Apr Vol 5 No 4 p 70.

[38] TEBOULLE. La rage chez le chien —*Rev Prat Malad des Pays Chauds.* 1932 Feb 11th Year Vol 12 No. 2. pp 55–59

[39] RECORDS (Edward) Rabies—its History in Nevada —*California & Western Med* 1932 Aug Vol 37 No. 2 pp. 90–94

[40] BALOZET (L) Les six premiers mois d'application de la vaccination antirabique des animaux à l'Institut Pasteur de Tunis —*Arch. Inst Pasteur de Tunis* 1932 July Vol 21. No 1 pp 176–180

[41] JONNESCO (Demetre) Recherches sur la vaccination préventive des chiens avec le virus rabique fixe-chien —*Ann. Inst. Pasteur* 1932. Sept Vol 49. No 3 pp 332–342

vii. *Postvaccinal Paralysis.*

TARTAKOFF and VIBBER[42] discuss two cases of postvaccinal paralysis following treatment by Semple's method. Neither was fatal. In the first the symptoms were those of a dorso-lumbar myelitis, the second was of the Landry type.

viii. *Miscellaneous.*

In 1897 DELÉARDE published the statement that animals alcoholized during the course of vaccination do not acquire any immunity against rabies. REMLINGER and BAILLY[43] as the result of experiments upon 20 rabbits, show that the rabicidal power of the serum of alcoholized animals is identical with that of animals which have received no alcohol. Though they will continue to recommend abstinence during the course of antirabic treatment, there is no evidence that non-adherence leads to the failure of the treatment.

From experiments on rabbits NICOLAU, CRUVEILHIER and KOPCIOWSKA[44] find that injection of fixed virus brain administered before (14 rabbits), during (16 rabbits), or after (9 rabbits) the injection of sheep red blood cells, augments the titre of haemolysins in the serum to a much greater degree than does the injection of emulsions of normal brain. Thus where the blood cells were introduced first, the titre in the case of fixed virus brain rose to a maximum of 6,000, in the case of normal brain it rose to about 2,250, and in the controls, which had received no brain substance of either sort, to about 750. *A. G. McKendrick.*

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[42] TARTAKOFF (Joseph) & VIBBER (Foster L.). Rabies Vaccine Encephalomyelitis. Case Reports.—*New England Jl. of Med.* 1932. Sept. 15. Vol. 207. No. 11. pp. 497–498.

[43] REMLINGER (P.) & BAILLY (J.). L'alcoolisme expérimental ne s'oppose pas à l'établissement de l'immunité antirabique—*Bull. Acad. Méd.* 1932. May 31. 96th Year. 3rd Ser. Vol. 107. No. 21. pp. 734–737.

[44] NICOLAU (S.), CRUVEILHIER (L.) & KOPCIOWSKA (L.). Influence de la vaccination antirabique sur l'élaboration des hémolysines dans l'organisme du lapin.—*C. R. Soc. Biol.* 1932. June 27. Vol. 110. No. 22. pp 533–535. With 2 text figs.

PELLAGRA.

STATISTICAL BULLETIN. METROPOLITAN LIFE INSURANCE CO. 1932. June. Vol. 13. No. 6. pp. 5–7.—**Pellagra Mortality among Wage-Earners.**

The pellagra death rate in America, particularly in the Southern States, for 1930 and 1931 has declined. This is true both of the wage earning classes and of the community as a whole. It is remarkable that this should be so in view of the widespread unemployment which has prevailed, especially in 1931.

A study of pellagra mortality among Metropolitan industrial policy holders for the period 1911–1931 shows no continuous trend. The highest figures were recorded in 1914 and 1915 but after this a continued fall took place reaching its lowest in 1924. For the next five years the curve took an upward trend until recently when it has fallen again. Thus " the facts do not show that the higher mortality rates always comes when business is at a low ebb." It is probable that the distribution of brewers' yeast by health departments is responsible for the recent fall in the death rate.

As regards other factors, colour and sex play an important part. The pellagra mortality rate among negroes is from two to five times the figure for whites and there is a preponderance of females, especially in the black races. *A. D. Bigland.*

WILSON (H.). **Pellagra in Egypt.**—*Jl. Egyptian Med. Assoc.* 1932. July & Aug. Vol. 15 Nos. 7 & 8. pp. 405–426; 490–503. With 8 charts.

No reliable statistics showing the prevalence of pellagra in Egypt are to be obtained. In 1902 SANDWITH found that in many Egyptian villages 35–62 per cent. of the fellahin were affected. Applying these figures to the adult population only, it would mean that 1½–3 million persons suffered from the disease. This figure is probably too high, as in it are included cases showing slight cutaneous or alimentary disturbances which to-day would be regarded as non-pellagrous. Moreover the admissions to Kasr el Aini Hospital and to the asylums 30 years ago do not suggest that such an enormous figure was ever accurate. Thus in 1900, 82 cases of pellagra were admitted to Kasr el Aini while during the years 1919–1928 the average annual admission rate was 84. In 1915 STIVEN found 4 per cent. of the inhabitants of villages in Sharkieh and Asyut were affected. If this figure be generally true then 400,000 persons in Egypt (excluding the large towns) are sufferers.

A further study of this problem was undertaken, the material comprising (1) admissions of pellagrous insane to mental hospitals during 1916–1931. (2) Pellagra cases among persons in prisons during 1917–1931. (3) Pellagra cases admitted to P.H.D. hospitals 1919–1928. The main findings are as follows :—There is no evidence that pellagra in Egypt has increased or diminished to any marked extent during the last 30 years ; during the years 1916–1922 there was a marked increase in the disease, possibly due to low wages and the high cost of living ; the incidence rate in Lower Egypt is nearly twice that in Upper Egypt and is probably related to the type of foodstuffs cultivated.

The second part of the paper deals with the etiology of pellagra. In respect to the part played by maize, it is suggested that the low value of maize protein compared with that of wheat and rice is an important factor. The author estimates that "a man would require in this country (Egypt) to consume not less than 2,000 grammes of dura bread a day if he were unable to supplement his diet by food of a higher protein value." The question of the possible toxic effects of maize, spoiled or unspoiled, is discussed as is also MELLANBY'S finding that toxic substances (toxamins) in cereals give rise to pathological conditions and that these toxamins can be neutralized by the appropriate vitamin. Thus, according to MELLANBY, the cutaneous symptoms of pellagra are due to vitamin B_2 deficiency while the nerve lesions are caused by the presence of a toxamin more especially present in maize. Nevertheless, the work of ROSCOE shows that maize contains weight for weight the same amount of vitamin B_2 as wheat and certainly more than does rice Furthermore, if maize were definitely toxic then the greater the amount consumed the worse should be the pellagra symptoms ; most workers will agree that the opposite is the case.

Dietary deficiency and its connexion with pellagra receives full consideration. Investigation of various diets reveals that neither deficiency nor excess of carbohydrates has any association with the disease and the same is true of fats, whether animal or vegetable. There is room for further research regarding mineral constituents, especially iodine, manganese and copper. Aluminium and silica are not considered to be of etiological importance.

The author is of the opinion that whatever may be the importance of lack of vitamin B_2 in producing dermatitis in rats and black-tongue in dogs it is not the cause of human pellagra. "There is certainly no symptom in pellagra so distinct and characteristic as to really justify

TABLE VII —Relative Value of some common Food Materials in regard to Pellagra assessed from their protein content valued on the basis of K. Thomas's original figures for the biological value of different proteins.

*A. Anti-Pellagrous value of protein of different origin		†B Available protein per cent in some common foods		§C Quantities of some common foods of equal A P protein value	
Animal Protein	100 (1·0)	Meat	19	Meat	100
Rice	88 (1·1)	Milk	4	Pulse	180
Potato	80 (1·2)	Rice	6·7	Rice	300
Pulse	55 (1·8)	Potato	1·5	Milk	470
Wheat	40 (2·5)	Pulse	19	Wheat	675
Maize & Millet	29 (3·4)	Wheat	7	Maize & Millet	1,000
		Maize	6·7	Bread Wheat	1,000
		Millet	6·6	Maize or Millet	1,800

*A. The figures in brackets are the factors by which the net (available) protein of the different components must be divided to obtain the anti-pellagrous value

† B. These figures represent the gross protein less the percentage normally lost from a mixed diet in the alimentary tract

§ C. These figures are calculated from the data given in parts A. and B. of this table.

> "To obtain the protein value of any given diet the protein content of each component is estimated and (after deducting 20 per cent. for loss in digestion from vegetable and 5 per cent from animal proteins) divided by the factor corresponding to Thomas's figure for that particular type.
>
> "The figures so obtained are added together and give the value of the protein of the whole diet in terms of animal protein."

the assertion that any pathological condition found in the lower animals is the true analogue of the human disease." Therefore, the best method of tackling the problem of pellagra is to examine the B_2 content of those diets which have been known to be associated with either the causation or cure of the disease. Tables are given showing the relative content of vitamin B_2 in various foodstuffs and the weight of common foods of equal B_2 value. It is claimed that a perusal of these figures will convince anyone that deficiency of vitamin B_2 has no connexion with pellagra. For example, 150 grams of meat added to a pellagrous diet of sufficient caloric value will cure the disease, while 210 grams of maize will not, and yet the B_2 content of each is about the same. Again, consideration of pellagra producing and preventive diets show that there is no consistent relation between the B_2 value and the incidence of the disease.

On the other hand there is a definite connexion between the protein value of the diets and pellagra. This protein value is dependent upon the amino-acid content and it is well known that vegetable proteins are less able to maintain nitrogen equilibrium than those in meat and other foods. The relative protein value of common foodstuffs is given in a chart and by calculation the "meat value" or the "antipellagrous value" of any diet can be obtained. When this figure falls below 40 grams daily the diet is pellagrous, while above this it is not, except when the protein requirement is raised by labour or in the presence of some factor which seems to exist in asylum conditions. Among other predisposing factors must be mentioned intestinal infections, such as dysentery and helminthiasis, and a previous attack of pellagra.

From a consideration of the above findings the author is of the opinion that "it seems impossible to avoid the conclusion that the cause of pellagra is a deficiency not so much in the absolute quantity as in the quality of the protein." *A. D. B.*

BOGGS (Thomas R.) & PADGET (Paul). **Pellagra. Analysis of 102 Cases.**—*Bull Johns Hopkins Hosp.* 1932. Jan. Vol. 50. No. 1. pp. 21–32. With 2 figs. [14 refs.]

The first part of this paper is summarized in the authors' own words: "(1) an analysis of 102 cases of pellagra is presented. (2) 31 of the cases were of the simple variety; 40 were post-alcoholic; and in 31 cases the disease arose as a complication of some other malady. (3) The alcoholic variety of pellagra has become more than four times as common since the enactment of Prohibition. (4) The clinical features of the disease are pointed out, the diagnosis is discussed, and the observation is made that there exists no difference between the three types."

Treatment consisted entirely in the liver diet of Minot and Murphy. Liver extract was tried in a few cases and proved equally effective. Out of 36 uncomplicated cases treated with liver diet alone 25 recovered, 7 died and 4 had residual nervous symptoms. Out of 35 similar cases not receiving liver diet 9 recovered, 24 died and 2 had residual nervous symptoms. Moreover, in the first group of recovered cases the average hospital stay was 32 days compared with 56 days in the second group.

For the dermatitis oily and greasy preparations are to be avoided; talcum powder gives much relief. The stomatitis can be controlled by a paste of sodium perborate or a solution of potassium permanganate; local applications of neoarsphenamine are unsafe. Hydrochloric acid in liberal doses is almost specific for the diarrhoea, and this remedy, too, may prove effective in the treatment of spinal cord changes. The psychoses are very resistant to all therapeutic measures. Blaud's pills (90–120 grains a day) or iron ammonium citrate is recommended for the anaemia. *A. D. B.*

FAKHRY (Assad). **Recent Advances in Diagnosis of Pellagra. The Utilisation of the Erythrocyte Sedimentation Rate in the Diagnosis of Pellagra. With a Demonstration of the Writer's Apparatus to record automatically the Result of the E.S.R.**—*Jl. Egyptian Med. Assoc.* 1932. July. Vol. 15. No. 7. pp. 427–437. With 1 chart & 5 figs. on 3 plates.

At the Kafr-El-Zayat Ankylostoma Hospital, Egypt, the author saw 214 cases of pellagra during 1930, and 202 during 1931. He computes that in Egypt there must be about 200,000 pellagrins. Among various clinical observations the following may be noted.—An unsuccessful attempt was made to transmit the disease by repeated injection of pellagra blood into a healthy subject. The wet type of the disease is very rare, being encountered only once in the series. Dermatitis of the fingers and toes is unusual probably owing to their protection from the sun's rays during work. Facial seborrhoea, however, was noted in 5 cases. Stomatitis is the earliest manifestation of pellagra. The incidence of intestinal bilharziasis was very high and the patients showed varying grades of anaemia, though the R.B.C. count was normal and leucocytosis was present, possibly due to the concentration of the blood following diarrhoea.

Particular attention was given to the erythrocyte sedimentation rate and an apparatus for recording this automatically is described. The reading in 10 normal cases varied from 3–10 per cent. after the first hour. In pellagra " 32 per cent. of the cases gave a reading between 10 and 30, 35 per cent. showed figures between 31–50, 27 per cent. between 51–70, and 6 per cent. above 70." " The characteristic thing about the E.S. curve in pellagra is that the corpuscles sediment rapidly in the second quarter of the first hour." *A. D. B.*

ISMAIL (Ahmed Shafick). **The Mental Aspect of Pellagra.**—*Jl. Egyptian Med. Assoc.* 1932. Aug. Vol. 15. No. 8. pp. 504–511.

According to different observers the number of pellagrins showing some form of mental trouble varies from 4 to 15 per cent. The association of pellagra with insanity is three-fold : (1) The physical disease may precipitate a latent predisposition and thus be merely the exciting cause of such conditions as manic-depressive insanity, dementia praecox, etc. (2) Pellagra may be associated with conditions such as mental defect, epilepsy, etc., especially when the patients are unable to look after themselves. (3) Pellagra may be the actual cause of the mental disturbance.

True pellagra psychosis is an intermittent and progressive amentia, which terminates in dementia if not cured. During the years 1912–1920, 757 insane pellagrins were admitted to Khanka Mental Hospital, Egypt. Of these cases 320, 42 per cent., were classified as amentia (confusional insanity), the typical psychosis of the early stages. On further analysis of the figures 81 cases of mania and 86 of melancholia were added, making the total for amentia 64·5 per cent. This series has now been extended up to 1931 and it was found that out of 978 pellagra cases 520 could be classified as acute confusional insanity. Of the 69 admissions during the year 1912 [*sic*], 13 were discharged, 31 died and 25 who remained in hospital became demented.

In general, before admission to hospital the patient has usually been depressed and irritable for some time. When certification becomes necessary suicidal tendencies are frequently found; thus in the 978 cases 234 were definitely suicidal, and 229 doubtfully so. So common is suicide by drowning that the term "hydromania" is used by the authorities. *A. D. B.*

RASSULEV (J. A.). Ueber Diabetes insipidus bei Pellagra. [**Diabetes Insipidus in Pellagra.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Sept. Vol. 36. No. 9. pp. 481–489.

The author describes three cases of a diabetes insipidus syndrome occurring during the course of pellagra. In two of the cases the pellagra symptoms were definite but in the remaining one a diagnosis of pellagra-sine-pellagra was made. The symptoms were excessive thirst and the excretion of large amounts of urine of low specific gravity. Thirst might have been due in these cases to the associated diarrhoea, but had this been so, oliguria and not polyuria would have been present and the specific gravity would have been high and not low. Radiologically there was no change in the sella turcica but injection of pituitrin gave temporary relief. The fact that improvement in the pellagra symptoms was accompanied by a retrogression of the diabetes insipidus syndrome suggests that the latter may be regarded as a true symptom of the former. The author also points out that the syndrome may be of value in the diagnosis of pellagra from other conditions which resemble it. [It is too ambitious to state after the observation of only three cases that diabetes insipidus occurs in 25 per cent. of pellagra cases.] *A. D. B.*

THAYSEN (Th. E. Hess). **Secondary Pellagra.**—*Acta Med. Scandinavica.* 1932. Vol. 78. No. 3–6. pp. 513–559. With 13 figs. [1 page of refs.]

Secondary pellagra is the term applied to that form of the disease which develops in patients suffering from chronic maladies of the digestive tract. Two such cases are described in very great detail.

The first case was that of a woman, 19 years of age, who 3½ years previously had been under treatment for ulcerative colitis. This was followed by appendectomy and she was well until the autumn of 1930. In September 1930 she began to suffer from dyspepsia and vomiting. In January 1931 for three weeks she was fed entirely through a duodenal tube. In February diarrhoea began and in April stomatitis and skin lesions on the face and hands made their appearance. Anaemia, symptoms suggestive of combined degeneration of the cord and osteoporosis were also present. The diarrhoea was not improved by medical treatment and antipellagrous diet but Natein tablets (4×2) were very successful and rapid recovery, which was maintained, resulted. A diffuse hypertrichosis developed in this case but cleared up with the disappearance of the other symptoms.

The second case was that of a woman, aged 48, who for many years had suffered from dyspepsia, achylia and constipation alternating with diarrhoea and associated with dilatation of the colon. "The first symptom of secondary pellagra was mental depression, developing in the course of the summer and autumn, improving in the following winter, and progressing again next spring, this time accompanied by pellagrous dermatitis, stomatitis with dysphagia, and proctitis. Aggravation of the depression and aversion for food. Death." Autopsy revealed nothing of importance except dilatation of the colon and splenic enlargement.

A very full survey of the literature of secondary pellagra is given and analysis of the cases shows that the primary digestive disturbance most frequently consists of " stenosis of the digestive alimentary canal (ca. 31 cases), chronic diarrhoea (7 cases), or diarrhoea alternating with constipation (4 cases). Gastritis with achylia or hypochylia, exclusion of gastric digestion through jejunostomy, or abnormal stomach function (pyloric stenosis) was found in 87 per cent. of the entire material."

The cause of secondary pellagra is discussed in relation to the etiological studies of GOLDBERGER. The avitaminosis in the author's first case may have been exogenous but probably was endogenous, as undoubtedly it was in the second case. *A. D. B.*

SABRY (Ibrahim). **On the Chemical Nature of the Pellagra Toxin and the Discovery of the Thiosulphate Treatment of Pellagra.**—*Jl. Egyptian Med. Assoc.* 1932. June. Vol. 15. No. 6. pp. 365–389. With 4 plates. Also in *Jl. Trop. Med. & Hyg.* 1932. June 1. Vol. 35. No. 11. pp. 164–172. With 1 fig.

BLOCH of Zurich has shown that the human pigment melanin is formed from a mother substance allied to tyrosin which he has named " dopa," by the action of a ferment, " dopa oxydase," found mostly in the basal layer of the skin. Assuming that pellagra is a toxaemia and that its chief symptom is pigmentation of the skin then the toxin must be causally related to this pigmentation. In other words, it must be dioxyphenilalanine, *i.e.*, tyrosin containing two hydroxyl groups instead of one. Thus the " dopa " of BLOCH is similar to pellagra toxin. " Dopa oxydase " ferment is stimulated and activated by the sun's rays. It is claimed, moreover, that hyper-pigmentation in pellagra is Nature's method of cure, since the " dopa " or toxin of the disease is deposited in the skin as harmless melanin.

The periodicity of pellagra is explained as follows.—Maize in Egypt is collected and dried during December and early January sees its entry into the peasants' diet. Now, the skin symptoms of the disease appear in March. During these three months " dopa," derived from maize, has been accumulating in the body and its neutralization and deposit as melanin begins. If now the patient be allowed no more " dopa " in his diet, in time all the toxin will be neutralized and recovery will take place. But patients usually continue their harmful diet after the rash has disappeared in May or June with the result that in the beginning of autumn the skin symptoms reappear. This explanation has clinical support in that autumn cases are more severe than those in spring and show a higher mortality.

The author is strongly opposed to the vitamin-deficiency theory of pellagra. He argues that the thiosulphate treatment could not cause the remarkable improvement it does if the disease were an avitaminosis, and he points out that the Egyptian peasant consumes large amounts of vitamins especially during the winter months. Every one of the author's 97 cases admitted the consumption of milk which is known to be rich in vitamin G. The experimental condition produced in the rat by vitamin G deficiency " only in part superficially resembles some symptoms of pellagra." Cases of pellagra where no dietary defect can be discovered also strengthens the author in his belief in the toxic nature of the disease.

In order to gather further information on the role of maize in pellagra etiology the author visited villages in Upper and Lower Egypt during the maize harvest. He was struck with the multiplicity of colours found in the grain and he came to the conclusion that a pigment-forming substance similar to " dopa " was present in maize and that this had undergone oxidation. Upon such grounds he is of the opinion that maize is only etiologically important because it contains a toxic substance which may be, and is, present in other foods. Two cases of pellagra occurring after the consumption of large amounts of an artificially pigmented wine are described.

Coming to the influence of sodium thiosulphate on pellagra, experiments are described which tend to show that " dopa " in the presence of thiosulphate is chemically changed and a connexion is traced between the colour of maize grains and their toxicity. Therapeutically 10 cc. of a 10 per cent. solution of pure sodium thiosulphate in distilled water are given daily by intravenous injection. The results obtained in all the 97 cases treated were " more or less the same." The skin lesions disappear after 5–6 injections, the other symptoms shortly follow suit and " the pellagra is aborted by a course of 10–15 injections." As regards relapses it is difficult to say whether these are due to insufficient treatment or to a fresh invasion of the causal toxin. Four patients were kept under observation in hospital for a year after the date on which they would normally have been discharged and none has so far relapsed. *A. D. B.*

WHEELER (G. A.) & SEBRELL (W. H.). **The Control of Pellagra.**—*Jl. Amer. Med. Assoc.* 1932. July 9. Vol. 99. No. 2. pp. 95–98.

Etiological factors in pellagra fall naturally into two groups. The first concerns the individual and includes such conditions as food fads, alcoholism, gastro-intestinal disease and other disturbances resulting in a disordered diet. From such causes sporadic cases arise. The second group concerns the community and includes the vital factors of food supply and the money wherewith to obtain it. In this group is found endemic pellagra which accounts for perhaps more than 98 per cent. of all cases. During 1930 7,146 deaths from pellagra in the U.S.A. were recorded. Of these 97·9 per cent. occurred in those states lying wholly or partially within the cotton belt. Morbidity figures show that for each death there are not less than 35 cases of the disease and for every case there is a large number of sufferers from minor degrees of malnutrition and debility.

" In no disease is the response to proper treatment or prophylaxis more gratifying." Why then is not more progress being made in pellagra control? It is one thing to draw up a program but quite another thing to have it carried out, especially as the ultimate responsibility falls upon the sufferers themselves. The important point is to have readily available an adequate poverty-resistant and depression-proof diet. This is difficult to obtain when farms depend upon growing cotton and become less and less self-supporting as regards other crops. Curiously enough the present slump in the price of cotton which has brought about an increase in the prevalence of pellagra will, if continued long enough, eventually correct matters by forcing farmers to grow other crops.

In approaching the problem of pellagra control it must be remembered that about 90 per cent. of the cases have their onset during the months April–July. As it takes from three to five months of restricted diet to produce pellagra it follows that during the late winter and early spring the diet should receive particular attention. The Public Health Service has examined the pellagra-preventive power of 35 foodstuffs, and a list is given showing which are of value and which are lacking in this respect. It will be seen that during the early portion of the year the diet of many people in the pellagrous districts is limited almost entirely to the non-preventive class of foodstuffs. These foods are useful as a basis for nutrition but require supplementing.

The concluding remarks have an obvious bearing upon prophylaxis : " In looking for cases of pellagra the home surrounded by evidence of a good garden, or a cow or two, a few pigs and some poultry may as well be passed up, for the chances are less than one in a thousand that pellagra will be found. On the other hand, the home surrounded only by last year's cotton patch will always bear watching." *A. D. B.*

SANDELS (Margaret R.) & GRADY (Eunice). **Dietary Practices in Relation to the Incidence of Pellagra. I. A Study of Family Dietaries in Leon County, Florida.**—*Arch. Intern. Med.* 1932. Sept. Vol. 50. No. 3. pp. 362–372. With 1 graph. [20 refs.]

A study of the dietaries of 29 families in Leon County, Florida, is here described. In 16 of these families one or more active cases of pellagra were present (in all but one the only adult affected was the housewife). The remaining 13 families were free from the disease and served as controls. Thus dietary records, 93 in number and covering a period of 7 days each, were collected during midwinter, spring, late summer and fall.

Comparison of the records of the pellagrous and control families shows differences in the use of milk and succulent vegetables, especially during the fall and winter. The supply of lean meat and fish in the two groups was similar but there were some slight changes found in the use of eggs, cheese and fruit.

This distinct seasonal variation in the supply of milk and succulent vegetables " confirms the observations of previous investigators and extends their findings in showing that this seasonal influence is sufficiently more marked in the dietaries of the pellagrous families to constitute an important difference in the dietary practices of the two groups."

" The results would seem to justify emphasis, in practical dietary recommendations, on the need for an increased use of succulent vegetables during the months when garden produce is less plentiful and for the establishment of a uniformly liberal milk supply throughout the year." *A. D. B.*

UNDERHILL (Frank P.). **Clinical Aspects of Vitamin G Deficiency.**—*Jl. Amer. Med. Assoc.* 1932. July 9. Vol. 99. No. 2. pp. 120–124. [35 refs.]

Vitamin G is the new name given to the heat-resistant pellagra-preventive factor. The view that deficiency of this vitamin is entirely responsible for causing pellagra must be accepted with some caution. It is possible that several deficiencies are involved.

The whole subject of pellagra etiology is reviewed from the clinical and experimental standpoint. The present position is well summed up in the words of TURNER : " It is now five years since Goldberger and his colleagues announced their studies on the value of factor P-P (now called vitamin G or B_2) in preventing the relapse of cutaneous pellagra in a group of patients in the Milledgeville Hospital. These results have been accepted widely as establishing the identity of pellagra with certain syndromes produced in experimental animals, and as final proof that factor P-P is the cause of pellagra. During these years those of us who see pellagra frequently have seen a large percentage of patients either die or go into chronic illness in spite of what appeared to be ample opportunity for vitamin therapy to have been effective. The rather poor showing of vitamin therapy in pellagra may be used either as argument against the specificity of vitamin G or it may be interpreted as indicating that changes have taken place due to pellagra or some other disease or constitutional state which makes the vitamin ineffective."

It is only fair to state that vitamin G, or indeed any therapeutic measure, may be useless when structural changes have taken place and the author points out that in his own experimental work with dogs it is much easier to prevent the appearance of symptoms than to cause their disappearance. Even so, in early stages of the experimental disease cure is obtained.

Finally there is a discussion of pellagra occurring in alimentary disorders as a secondary condition, for example in alcoholics and among wealthy patients who in spite of plentiful food for some reason, probably psychological, refuse to take a well balanced diet. ROBERTS has recorded 25 such cases in none of which was a balanced diet of meat, milk, eggs or wholesome vegetables taken. It is significant that in this group there were 21 women. The treatment of epilepsy with a ketogenic diet has led to the appearance of pellagrous symptoms and these have cleared up upon the resumption of normal feeding.

A. D. B.

BERIBERI.

MAKI (Hiroshi). Observation statistique des décès causés par le béri-béri au Japon propre. [**Deaths from Beriberi in Japan.**]—*Kitasato Arch. Experim. Med.* 1932. July. Vol. 9. No. 3. pp. 202–217. With 7 graphs.

——. Observations statistiques des décès causés par le béri-béri au Japon (non compris les colonies).—*Rev. d'Hyg. et de Méd. Préventive.* 1932. Nov. Vol. 54. No. 9. pp. 649–662. With 7 graphs. [Summary appears also in *Bulletin of Hygiene.*]

In the 10 years 1920–29 there were in Japan on the average 17,000 deaths from beriberi annually, a death rate of 29·4 per 100,000. Of these, 62 per cent. were deaths of males, 38 per cent. of females ; this sex discrepancy is at its maximum at ages 45 to 70 when 84 per cent. of the deaths relate to males. At ages 0–4 there is very little difference between the sexes, but at ages of adolescence males are also specially affected. The death rate is at its highest in the first year of life, 416 per 100,000, becomes negligible at ages 2–9, rise to about 25 per 100,000 at ages 20–24, and is about 11 to 13 per 100,000 at ages 40–80. The deaths show a marked seasonal distribution, rising in May and reaching their peak in the autumn. In fatal cases three-quarters of the deaths follow an illness of less than one month. The death rate of the large towns is more than twice that of the rural areas and small towns. Amongst infants the greatest number of deaths falls in the second month of life, and thereafter falls progressively. Beriberi is shown by these statistics to be one of the important causes of death in Japan, especially as a cause of infant mortality. *A. Bradford Hill.*

PARREIRAS (Decio), ALTINO DE ARAUJO (Edgar), RAMOS (Mario), GONÇALVES (Barreto), BARROS (Ruy Rego), LUCENA (J.) & DE OLIVEIRA (Luciano). Contribuição ao estudo do beriberi. [**Contribution to the Study of Beriberi.**]—75 pp. Departamento de Saúde Publica. Estado de Pernambuco. (Publicação N.3). 1932. Aug. [Summary appears also in *Bulletin of Hygiene.*]

When, in December 1931, cases of a disease which appeared to be assuming an epidemic character occurred on the island of Fernando de Noronha, off the coast of Brazil, information was sent to the Director of the Department of Public Health of the State of Pernambuco and a commission of experts was deputed to investigate it. This publication gives an account of the enquiry and its results ; it is divided into six chapters each written by a different member of the commission. All agreed that the disease was beriberi.

Chapter I, by Dr. Gonçalves, describes the geography of the island, its situation, constitution, climate, the inhabitants and the dwellings they occupy ; he gives also analyses of the water supply. The island serves as a penal settlement, for both civil and military offenders, and the inhabitants consist largely of prisoners and those engaged in looking after them. In chapter II Dr. Parreiras discusses the epidemiology of the outbreak which began in December 1931, reached its acme in the following April and died down rapidly from May onwards. The constituents of the food ration are given, and appear to be in quantity adequate, but nothing is said as to the mode of preparation.

The total population was 1,560 and among them were 135 cases ; in successive months from December to May the numbers attacked were 3, 17, 23, 24, 57, 11. 131 cases occurred among 1,306 males (10 per cent.) and only 4 among 254 females (1·6 per cent.). The age incidence is also given in a table showing that more than half, 78 out of 135, were between 21 and 30 years, but as the numbers at the different ages are not stated these figures convey no information of value. There were 11 deaths. In a former similar outbreak in 1919 there were 8 fatal cases [the number then attacked is not stated]. A most noteworthy point is that the incidence among the soldiers who were better fed and housed was 104 among 357 (29 per cent.) and among 615 prisoners only 20 cases (3·2 per cent.).

Dr. Ramos, in the succeeding chapter, describes his laboratory investigations on the kakke bacillus of Matsumura. He carried out more than 6,000 agglutination tests and identified the organism, *Bact. coli communius*, in 25 of 36 stools examined (69 per cent.) and agglutinated it with the serum of patients, but, on the other hand, 25 sera out of 50 normal, healthy subjects (50 per cent.) also agglutinated it and he draws the natural conclusion that this organism is not specific of beriberi.

Dr. Barros studied the basal metabolism of 11 patients and found it high in all, contrary to what is usually the case in beriberi.

In chapter V Dr. Altino de Araujo gives an account of the clinical aspect, the chief symptoms being general weakness, especially marked in the legs, oedema of legs, palpitation and dyspnoea, with rapid death in some patients. A few suffered from gastro-intestinal disturbance, nausea, vomiting and diarrhoea, early in the illness. The blood pressure findings are interesting. Of 54 patients examined 34 had a normal maximum, 29 a normal minimum [presumably by maximum and minimum is meant systolic and diastolic pressures]; 16 had a maximum and 2 a minimum above normal and 4 a maximum and 23 a minimum below normal. In other words the maximum was normal in 63 per cent., raised in 30, lowered in 7, while the minimum was normal in 54, raised in 4 and lowered in 42 per cent.

In the final chapter Dr. Lucena speaks of the nervous symptoms present and the results of examination of the cerebrospinal fluid by the Lange test and the Wassermann reaction. Six showed a definite disturbance of tactile sense with zones of hyper- and hypo-aesthesia; in 2 patients there was allocheiria, 5 had paresis or actual paralysis, 18 complained of pain on pressure of the calf muscles and passive movement was also painful; the knee jerks were abolished on both sides in 7, unilaterally in 1, diminished in 6, brisk in 5, normal in the rest. The calf muscles were atrophied in 8, and in 3 the thenar and hypothenar muscles. The ocular reflexes were unaffected. *H. H. S.*

HILLERET & CHARPENTIER. Considérations médico-militaires sur quelques cas de béribéri constatés au 1er bataillon sénégalais de Tananarive et au 2e bataillon malgache de Majunga du 1er régiment mixte de Madagascar. [**Beriberi in Native Troops in Madagascar.**]—*Ann. de Méd. et de Pharm. Colon.* 1932. Jan.–Feb.–Mar. Vol. 30. No. 1. pp. 90–95.

During December 1930 a small outbreak of beriberi occurred in a battalion of French Colonial Troops at Antananarivo, Madagascar. Of 20 cases showing oedema of the legs 2 proved to be suffering from old cardiac lesions, 10 had ankylostomiasis but the remainder were apparently true cases of beriberi. Measures such as giving "red" rice; partial substitution of European food for native diet; the consumption of meat, fish, potatoes, tomatoes, fresh fruit, etc., and the reduction of physical fatigue to a minimum soon proved successful.

In another battalion at Majunga a second outbreak occurred during April 1931. Of the 16 cases 4 were serious and 1 died of acute myocardial weakness. Prophylactic measures were put into operation and by June no fresh cases were reported.

Apparently the cause of these two small epidemics was the eating of imported rice, the milling of which had been too complete and performed too long a time before consumption. *A. D. Bigland.*

BELMONTE (Demetrio). **Preliminary Studies by the Office of the Public Welfare Commissioner on the Different Brands of Tiki-Tiki Extract.**—*Jl. Philippine Islands Med. Assoc.* 1932. June. Vol. 12. No. 6. pp. 273–281.

Tikitiki extract (extract of rice bran) has been very successful in the treatment of infantile beriberi in the Philippines. It is not surprising, therefore, that many brands of this product have appeared on the market. The present paper deals with experiments undertaken to show the efficacy, or otherwise, of the various preparations. The dosage used was as follows: to the mothers, besides a balanced diet, a tablespoonful of the extract was given after meals, while to the babies in mild cases 3–4 teaspoonsful were administered daily and in serious cases 5–7 teaspoonsful daily. On account of the laxative effect of tikitiki the above doses had sometimes to be modified in infants.

The results showed that the different brands of tikitiki extract have varying effects and it is therefore suggested that the preparation should be standardized to contain at least a given amount of vitamin B. It was also found that the extract is effective in the adult form of the disease and, therefore, should be given to women during pregnancy and lactation both for therapeutic and prophylactic reasons.

A. D. B.

VAN VEEN (A. G.). Over het B_1-vitamine-gehalte van geslepen rijst en van zilvervliesrijst. [**The Vitamin B_1 Content of Silverskin Rice and Polished Rice.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Aug. 16. Vol. 72. No. 17. pp. 1146–1150. German summary. [Summary appears also in *Bulletin of Hygiene.*]

Machine milled rice frequently contains considerable anti-beriberi vitamin; usually more than 0·5 mgm. per 500 gm. This residual vitamin can, of course, easily be removed by washing, whereas with unpolished rice this is not so. Washing milled rice appears to remove as much, if not more, vitamin B_1 as the original milling. The vitamin B_1 content of silverskin rice is at least as great as, if not greater than, that of Katjang-idjoe (*Phaseolus radiatus*), amounting to 1·5 mgm. per 500 gm. It was not found that red silverskin rice is particularly rich in vitamin, as is sometimes stated. Various sorts of rice meal, such as Katjang-idjoe meal, are not necessarily rich in vitamin B_1, though they are often used for their supposed richness in vitamin. It is desirable that many specimens of silverskin rice and polished rice from different sources be tested for their vitamin B_1 content. *H. N. H. Green.*

COHEN (A. J.) & AZIR. Bijdrage tot de kennis van de werking van vitamine-B (Jansen and Donath) bij beri-beri. **[Vitamin B (Jansen and Donath) in Beriberi.]**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. June 7. Vol. 72. No. 12. pp. 738–761. With 8 figs. on 4 plates.

The authors treated 18 beriberi patients with pure vitamin B, isolated by JANSEN & DONATH, partly by the way of intramuscular injections, partly in tabloid form. In uncomplicated cases the action of the injections was sometimes very striking ; especially in cases of the acute cardiac type of beriberi (Shoshin) the preparation had a life-saving influence. Complications (hookworm disease, syphilis, etc.) interfered with the results. Administered in tabloids the purified vitamin may have a favourable influence on heart, blood pressure and diuresis. Probably the vitamin itself raises blood pressure in beriberi, possibly owing to its vasoconstrictory action. Sometimes actual hypertension may arise in this way, as well as by overfeeding with " kachang idjau." The importance of blood pressure control during treatment of beriberi cases is emphasized. *W. J. Buis.*

COWGILL (George R.). **Vitamin B_1 in Relation to the Clinic.**—*Jl. Amer. Med. Assoc.* 1932. June 25. Vol. 98. No. 26. pp. 2282-2288. [49 refs.]

This article is one of a series devoted to the application of vitamin study to clinical medicine. The subject of vitamin B_1 deficiency can best be considered under two headings : (i) where the deficiency is extreme, *i.e.*, beriberi, and (2) where the deficiency is only slight or moderate.

(1) An account of beriberi, including etiology, diagnosis and pathology is given. The disease is comparatively rare in the United States. Having regard to the separation of the original vitamin B into two fractions B_1 and B_2, it is interesting to note that cases have been recorded in which beriberi and pellagra exist together. Rice is deficient in both B_1 and B_2 vitamins but in the East fish forms a usual part of the diet and this being fairly rich in P-P factor accounts for the occurrence of beriberi and not pellagra. On the other hand corn meal, the staple food of pellagrins in the Southern States, is low in B_2 factor but when eaten in large amounts supplies an adequate quantity of B_1.

The relationship between beriberi on the one hand and fevers and gastro-intestinal disturbances, including jaundice and achlorhydria, on the other, is discussed. In general it may be said that individuals subsisting on diets in which the vitamin B content is too small or barely sufficient can be brought into a state of extreme deficiency when subjected to prolonged fever or heightened metabolism.

There are many conditions besides beriberi in which injury to the nervous system is a feature of extreme vitamin B deficiency ; for example the spinal cord lesions in pernicious anaemia and the changes in the brain in pellagra. With regard to the clinical application of such studies it is stated that " in the face of the uncertainty as to what part is played by this vitamin in the nutrition of the nervous system, it seems justifiable to advocate administration of the vitamin in such cases, especially when this therapeutic measure is so easy to carry out and cannot do any harm."

(2) In the group in which vitamin B deficiency is slight or only moderate two main symptoms are discussed.

Anorexia.—It has been noted that in dogs fed upon a diet perfectly balanced except for vitamin B loss of appetite soon occurs and can be regained immediately by correcting this deficiency. The clinical application of this is obvious when due allowance is made for the fact that anorexia is usually only a symptom. Thus in marasmic infants, in cases of mental defect, during convalescence, etc., there is evidence to show that the administration of vitamin B has done much good. Another interesting observation is that when dogs fed on a vitamin B-deficient diet are given the missing factor they immediately consume large amounts of water and void much urine. This may have some relation to the oedema of beriberi and to the anhydraemia in certain marasmic infants. It is obvious that all the conditions already mentioned as favouring the development of beriberi (fever, heightened metabolism, etc.) also operate in bringing about a moderate shortage of vitamin B and, therefore, are of special interest to clinicians.

Restriction of growth.—While inadequate amounts of calcium and vitamin A may play an important part in limiting growth the studies of MORGAN and BARRY show that shortage of vitamin B can also be responsible in this respect in the case of American school children. The economic conditions associated with the present crisis are, as regards diet, more harmful to children in view of their lower tissue storage of vitamin reserve and their relatively greater need of this factor.

Finally the sources of vitamin B for clinical use are discussed. Yeast and wheat germ are two excellent sources of the vitamin. Larger amounts are contained in liver, kidney and brain than in muscle. Whole grains in contrast with milled varieties can supply appreciable amounts of this factor, while tomatoes, raw cabbage, fresh spinach and legumes are richer than orange and lemon juices, onions, lettuce or cauliflower. In the egg the vitamin is located in the yolk. Milk contains a good supply of B_2 factor but not B_1, therefore it is well to supplement the infants' milk diet. The importance of demanding proof that special concentrates of vitamin B on the market do actually contain this factor is stressed. *A. D. B.*

WENCKEBACH (K. F.). Der Mechanismus des plötzlichen Herztodes bei der Beriberi. [**Mechanism of Sudden Heart Failure in Beriberi.**] —*Klin. Woch.* 1932. Sept. 24. Vol. 11. No. 39. pp. 1641–1647. With 5 figs. [14 refs.]

Prof. Wenckebach, of Vienna, under the auspices of the Queen Wilhelmina Jubilee Fund, was invited to visit the Dutch East Indies to study beriberi on the spot. The following constitutes a preliminary report of his researches concerning the mechanism of sudden, fatal heart failure in the disease.

" Shôshin," or sudden cardiac failure, occurs chiefly in young beriberi subjects who are apparently well and able to walk about. It is characterized by the most acute distress with severe pain in the chest and upper abdomen in the region of the liver. Death is very apt to occur. In order to obtain a clear *post mortem* cardiac picture the body was injected with formalin immediately after death. In nine cases so examined the findings were exactly similar except for variations in the size of the left ventricle. There was enormous enlargement of the right heart with great engorgement of the large veins and liver, which latter was of globular shape. In order to prove that the injection itself played no part in these appearances, a heart in one of the cases was removed very soon after death and, though no formalin had been used, the organ had the appearance of having been forcibly distended and the wall of the right auricle was so thin that the blood could be seen through it. In addition, the right ventricle formed practically the whole of the heart when viewed anteriorly and the right conus arteriosus was markedly curved forwards. This last finding is very important as it is a never-failing component of the right-sided cardiac dilatation and is pathognomonic of the condition.

At Batavia the clinical side of the picture was studied. Twelve cases were analysed in which cardiovascular symptoms were practically the only sign of beriberi, there being no obvious oedema and no definite neuritis. The following are the chief findings: (1) The heart is enlarged, both clinically and radiologically. Even in slight cases the degree of enlargement is surprising, especially in the small-hearted Malay. (2) Various cardiac murmurs are heard, mostly systolic or presystolic in time, but in severe cases also diastolic. (3) Visible and palpable pulsation is present over the praecordium, particularly in the intercostal spaces on the left side. A strong apex beat may be felt but frequently it is absent. (4) Corrigan's collapsing pulse and a murmur heard over the large arteries are noted. (5) There is engorgement of the veins in the neck and arm while the liver is invariably swollen, painful and, in severe cases, pulsating. (6) Dyspnoea, with praecordial and epigastric pain, is the rule. (7) The calves are thickened and tender but there is no pretibial oedema.

Ordinary cardiac remedies are useless in "shôshin." Adrenalin makes the patient worse; indeed the effect of this drug on beriberi patients is so pronounced that in doubtful cases it may clear up the diagnosis. The hypodermic injection of 1 cc. of a 1 in 1,000 solution increases the cardiac rate and palpitation; the vascular murmurs become more pronounced reaching even "pistol shot" intensity; the diastolic pressure sinks almost to zero; the veins of the neck and arm swell visibly; the liver becomes larger and harder; the heart increases in size and the right side presents so that pulsation is seen to the left of the sternum. It is also recorded that the venous pressure (estimated with a needle in one of the large veins of the arm, according to the method of Tabora and Moritz), which is always high in beriberi patients, after adrenalin injection quickly rises still higher, from 6–16 cm. of water to 12–24 cm. All these findings are absolutely identical with those present in spontaneous "shôshin."

Very different is the effect of pitressin (P. D. & Co.). In severe cases almost immediately after injection the diastolic arterial pressure rises from about zero to 75 or even 90 mm.; the venous pressure suddenly falls; palpitation, dyspnoea and the feeling of tension in the upper abdomen, decrease; the area of cardiac dullness diminishes; the praecordial pulsation disappears and the lung margins once more cover most of the heart. In short, except for the heart remaining large, the patient has lost all his symptoms and this happy relief lasts from 25 minutes to 1¾ hours.

Two factors, it is claimed, are together responsible for the cardiac symptoms in beriberi: (1) a degeneration of the myocardium leading to a loss of muscular tone which normally prevents distension of the organ. In this way the heart, particularly on the right side, never completely empties itself during systole. (2) Dilatation of the finer ramifications of the peripheral arterial system leading to an increased supply of blood which swamps the large veins, liver and right side of the heart. *A. D. B.*

WENCKEBACH (K. F.). Het raadsel van het stervende beri-beri-hart. [**The Riddle of the Failing Beriberi Heart.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. July 5. Vol. 72. No. 14. pp. 915–925. With 1 plate.

Prof. Wenckebach discusses the results of his study-tour through the East Indian Archipelago and comments in turn upon :

1. The beriberi heart after death, which shows an enormous dilatation in fresh cases, especially of the right half. The same condition exists in the venous system. This enormous afflux of blood is most surprising in view of the undoubtedly existing weakness of the heart.

2. The symptoms of the heart and vessels in recent acute cases. Such are more frequent than is commonly known. Dilatation of the heart, murmurs, strong pulsations, a hammering pulse and bruits over the larger arteries, overfilling of the venous system, with painful swelling of the liver, shortness of breath, palpitations and swelling of the muscles of the calves—symptoms which are harmfully influenced by the slightest bodily exertion of the patient—constitute a most confusing condition for medical interpretation.

3. AALSMEER'S adrenalin test (see this *Bulletin*, Vol. 29, p. 614) is able to bring about a recrudescence with all the acute symptoms in cases on the way to recovery. The lowering of the blood pressure in the arterial system with simultaneous increase of the venous pressure is caused by a " leakage " of the arterial reservoir into the venous system, *i.e.*, by an important dilatation of the peripheral circulation (small arteries and pre-capillary vessels).

4. The pitressin test, *i.e.*, the injection (with caution !) of the vasomotor substance from the posterior lobe of the hypophysis (Parke Davis) has exactly the contrary effect and is able to cause a sudden disappearance of the symptoms for some time.

5. The degeneration of the heart and skeletal muscles is characterized by a retention of water *within* the muscle cells, in contrast with oedema of the muscle which is an accumulation of water between the muscle fibres. This condition is a very typical disturbance of the metabolism of the muscular system in beriberi. It is not justifiable, however, to ascribe the paralysis of the vessels to the same cause, in view of their prompt reaction to pitressine and the different anatomical structure of their muscular wall.

6. The beriberi of nurslings is to be considered as a proof of the existence of much latent beriberi among the natives. Its diagnosis is difficult and its symptomatology still very uncertain. Yet undoubted reactions to the administration of vitamins have been noticed.

7. In beriberi cases of some duration the overstretching of the muscle fibres of the heart is liable to cause lasting damage to this organ. Medical care is urgent in such cases. Besides vitamin administration, the use of pitressin deserves attention and further study. Yet in view

of its vasoconstrictor action, exerted upon the coronary arteries as well as upon the other parts of the arterial system, it should be used with much caution and only in cases of general weakness of the heart.

W. J. Bais.

AALSMEER (W C) & RICHTER (C S) Over den invloed van Lugoloplossing op het adrenaline effekt bij Basedow en beri-beri —*Geneesk Tijdschr. v Nederl - Indië* 1932 Aug 30 Vol 72 No 18 pp 1214–1218

HASCHIMOTO (T), AIZUMI (H), DENDO (K) & FURUNO (M) Beiträge zur Studien ueber die Colibazillen im Kot der Beriberikranken und dem der nicht an Beriberi leidenden Menschen —*Jl Oriental Med* 1932 Aug Vol 17. No 2 [In Japanese. German summary p 14]

PLAGUE.

FOURIE (L.). **Report on Plague in Ovamboland, South West Africa.**—*Union of South Africa. Ann. Rep. Dept. Public Health Year ended 30th June, 1932.* Annexure A. pp. 58–80.

The report is one which tells of an expedition by train of 500 miles to examine into an outbreak of plague in the tribal country of Ovamboland. In its beginnings the epidemic had been so mild as to be mistaken for something of the nature of climatic bubo. Lack of information is only to be expected when the epidemiology of a disease is being investigated among a primitive people, but some useful data have been accumulated. In much of the country affected the abundance and luxuriance of grass vegetation or the suitability of the soil for burrowing afforded favourable conditions for the indigenous rodents. The nature of the food supply and the primitive mode of living of the people are selected for notice as having " an important bearing on the spread of plague from rodent to man in Ovamboland." The staple food is a millet. Small rodents such as gerbilles are caught by digging up their burrows and these are eaten by both children and adults. Meteorological conditions were favourable to the continuance of plague during the year. Mean temperatures ranged from 60° to 80°F. and the saturation deficiency exceeded 0·3 of an inch only in the last three months of the year. An enumeration of the small mammals associated with the spread of plague in the Union together with their distribution is given. The multimammate mouse (Mastomys) " is virtually the domestic rat of Ovamboland." It seems too to be the most important intermediary between wild rodents such as the gerbilles and man. Of fleas which have been shown capable of transmitting plague from rodent to rodent the following were identified : *Ctenocephalus canis*, *Dinopsylla brasiliensis*, *Xenopsylla eridos* and *X. brasiliensis*. It is interesting to learn that the local view of the origin of the present outbreak is that infection " was introduced through mealie meal imported from the Union during the famine period of 1929–30," but this view is dismissed as untenable. The conclusion come to was that the available evidence points to the kraal rather than the outside veld being the most important source of infection and that this has been consequent upon the mortality among kraal rodents. *W. F. Harvey.*

ESKEY (C. R.). **Epidemiological Study of Plague in Peru, with Observations on the Antiplague Campaign and Laboratory Work.**—*Public Health Rep.* 1932. Nov. 18. Vol. 47. No. 47. pp. 2191–2207. With 12 figs. on 2 plates & 1 map.

Plague was first introduced into the port of Callao in 1903 and spread rapidly north and south. It reached its height six years after its introduction and has for the most part been restricted to the sea coast provinces and to adjacent mountain provinces north of 12° south latitude. A good plate of all the different species of flea occurring in Peru is given, but *X. cheopis* is probably the only transmitting agent which need be considered. Of rats which were concerned in plague transmission, *R. alexandrinus* and *R. rattus* were the predominating species, caught in those localities where the buildings were most infested. It was in those towns in which this infestation of the buildings was greatest that the incidence of plague was also greatest and this "regardless of the climatic location of the towns within or outside the zone most favourable to the existence of the chief transmitting agent *X. cheopis.*" A relative rat-proof construction of buildings is obviously a means of attaining to low incidence or even complete absence of human plague in Peru. Active antiplague measures began at the end of 1930 or beginning of 1931 and the results obtained in the first six months have been very good. The use of poison for the destruction of rats appears to have yielded very good results. Arsenic is the poison used and experiments have shown that a coarse cornmeal was the best material for making up the baits. Other details are given of the organization of this campaign. Chronic plague infection has never been found and mass inoculation of a suspension from small pieces of spleen and liver of all autopsied rats has been made daily into a guineapig. *W. F. H.*

MACCHIAVELLO VARAS (Atilio). Ensayo sobre la peste en Chile. [**Plague in Chile.**]—*Bol. Oficina Sanitaria Panamericana.* 1932. Sept. Vol. 11. No. 9. pp. 909–915.

This is an interesting general account of plague in Chile, treating of its history, the species and relative numbers of the rats and their fleas, and epidemiological considerations. Infection is said to have first entered Chile via Iquique and Valparaiso in 1903, later involving all the ports north of Coquimbo and appearing time and again transiently in the capital. It died out in Iquique in 1922 having caused 1,500 cases and 600 deaths. It reached Antofagasta in 1904, the most recent outbreak occurring in 1930; there have been 1,500 cases and more than 700 deaths. In Valparaiso plague has not been continuous and the total number attacked is barely 100. In Santiago it caused 23 cases in 1907 and in 1931 it was of the pneumonic type; there has been no serious epidemic in the capital.

The total number of cases in Chile is about 5,200, with some 40 per cent. (2,150) fatal. The maximum occurred in 1907 with 861 cases and 358 deaths. In the first five years there were over 2,250 cases, in the next five 2,140, in the third barely 400 and since 1918 not more than 300. Except for the last (pneumonic) outbreak in Santiago, the form has been bubonic with a few septicaemic.

As regards the species of rats, in Antofagasta in 1929 of nearly 5,000 examined the percentages were 21·6 *R. norvegicus*, 12 *R. alexandrinus*, 27 *R. rattus*, 39·4 *Mus musculus*. The first predominated in the commercial centres and on the quays and wharves, *R. rattus* in the city generally. In 1931 among nearly 10,000 examined *norvegicus* fell to below 17 per cent. and a marked diminution of them was noticed on the quays. In 1930 there were 86 found infected; more than half were *R. norvegicus* and one-fourth *R. rattus*.

The average number of fleas per rat was 20; on *R. norvegicus* 13·3, on *R. rattus* 35·1, on *R. alexandrinus* 31, on *Mus musculus* 12·5; *X. cheopis* was the commonest, 11, *L. musculi* next 2·3.

The author attaches great importance to climate in the epidemiology of plague, "relative humidity and the maximum and minimum temperatures governing the appearance or latency of plague in the northern ports." Whenever the minimum exceeds 15° and the maximum 25° with a relative humidity of 70 per cent. or thereabouts plague reappears. This, in his opinion, helps to explain its disappearance in the last 10 years during which the Chilian climate has altered in the north, being generally more temperate and colder and "thus unfavourable to development of the activities of *X. cheopis*." But many problems cannot be so explained: At Valparaiso the bionomics of *C. fasciatus* have to be taken into account; at Santiago there is much seasonal variation. The excessive heat of the summer is inimical to plague, whereas the winter favours pneumonic plague "but doubtless there are complications which call for detailed study."

H. H. S.

MATHIS (C.) & ADVIER (M.). Considérations épidémiologiques sur la peste au Sénégal (à propos du mémoire de G. Lefrou présenté à la séance du 8 juin 1932). **[Epidemiology of Plague in Senegal.]** —*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 941–944.

This article is mainly concerned with the refutation of the idea that human plague in Senegal was not a consequence of plague in rats, but was one of transmission from case to case directly by human fleas. The evidence for the commonly accepted view is taken up point by point. *W. F. H.*

DELANOË (P.). L'importance de la puce de l'homme. *Pulex irritans* L., dans les épidémies de peste au Maroc. **[The Importance of the Human Flea.** ***Pulex irritans*****, as a Vector of Plague in Morocco.]** —*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 958–960.

The author has long insisted on the importance of the human flea in propagating plague by transmission from case to case. In Morocco the numbers of *Pulex irritans* infesting the houses is almost incredible. This fact together with the known shortness of time that this flea remains infective are, according to the author, reasons why plague in certain parts of Morocco has been severe and yet has then disappeared completely for a period of years. *W. F. H.*

NOVIKOVA (E.) & LALAZAROV (G.). **The Rôle of Bedbugs in the Epidemiology of Plague. I. The Duration of Viability of Plague Virus in the Body of the Infected Bedbug.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 4. pp. 315–322. With 1 fig. [24 refs.] [In Russian. English summary pp. 323–324.]

Cimex lectularius, the bedbug used, was kept without food and then fed on infected mice or rats as soon as a bacteriaemia had manifested itself. Plague bacilli were successfully isolated from the faeces of the bugs in 37 per cent. of cases and the number of bacilli was at its greatest in the faeces from the 5th to the 12th day after infection. The bodies of dead bugs were emulsified in salt solution and agar plates sown with this emulsion. An abundant growth of plague bacilli was obtained in most cases. It was found that the plague virus "may remain virulent in the body of the bedbug for as long as 147 days" after feeding. In these experiments three of the infected bugs lived 186, 222 and 250 days respectively, but inoculation of animals with, and bacteriological examination of, the emulsions of these bugs gave negative results. Transmission of plague by the bite of an infected bug was successful in one case. *W. F. H.*

TUMANSKY (V.) & POLIAK (I.). **On the Preserving of Plague Virus in the Organism of Fleas in Suslik Nests at Non-Epizootic Period.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 4. pp. 325–326. [In Russian. English summary p. 326.]

A severe plague epizootic had occurred and had ceased by June. In the region of the epizootic 31 nests of susliks were dug out, 13 in November, 7 in December, 5 in January and 6 in February and yielded a total of 1,797 fleas for examination. The bacteriological examination of an emulsion of the alimentary canal showed 5 of the November fleas (2 *Neopsylla setosa* and 3 *Ctenophthalmus pollex*) to be plague infected, although their proventricles were free of the characteristic plugs. *W. F. H.*

KOPSTEIN (Felix). De rattendichtheid als factor in de epidemiologie der builenpest. [**Rat Density as a Factor in the Epidemiology of Bubonic Plague.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. July 19. Vol. 72. No. 15. pp. 960–968.

7,852 native dwellings in W. Java were examined for the number of rats they harboured; approximately 1,100 were examined 2–5 times for control of the results. The local rat density was found to be fairly constant; no great seasonal differences throughout the year were found, apart from epizoötics. Therefore the rat density may be considered as a useful factor in epidemiological research. Care must be taken to use different types of traps if catches follow each other in quick succession. The density of *R. rattus* is lower in places where plague has been prevalent. Yet such low density is no proof of epidemics in the past. *W. J. Bais.*

KOPSTEIN (Felix). Die geographische Verbreitung von *Xenopsylla astia* in Java und ihre Bedeutung für die Epidemiologie der Beulenpest. [**The Geographical Distribution of** *Xenopsylla astia* **in Java and its Significance in the Epidemiology of Plague.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Aug. 22. Vol. 114. No. 2. pp. 289–301. [41 refs.]

In 20 years of its history in Java plague has never become established on the southern coast of the island, in spite of all the rat-fleas there being *Xenopsylla cheopis*; on the northern coast it has occurred in some port towns but not in others. The purport of this long account of the geographical distribution of *Xenopsylla astia* in Java is to throw some light on this relative immunity of the coastal zone of the island from plague; it takes the British reader among very unfamiliar geography and place names. So far as is known *X. astia* occurs only on the coastal zone. On the northern coast, where seaports in communication with Asia are numerous, it is found in many of them, but not in Batavia and Passoeroean where the only rat-flea known is *X. cheopis*. On the southern coast, where there are only two seaports and one of them of small importance, it has so far not been found, at any rate in these ports. The house-fauna of the northern coast includes 3 rats—*Rattus diardi*, *R. concolor*, and *R. norvegicus* and the house-shrew *Pachyura murina*; in that of the southern coast *R. concolor* and *R. norvegicus* are wanting; but the absence of these two species has no significance since *R. concolor* is accompanied by *X. astia* in some places on the northern coast and *R. norvegicus* by *X. astia* in many of the northern ports. On the northern coast, again, besides Batavia and Passoeroean where *astia* is unknown, there are two other ports where the percentages of *astia* are only 8·8 and 14·6 against corresponding percentages of 91·2 and 85·4 for *cheopis*, all these four places having suffered from epidemics of plague. Furthermore, in six ports where plague has *not* occurred, *X. cheopis* is the only species known in two of them, and in the other four has percentages of 96·0, 87·4, 75·2, and 39·3 against correlated *astia* percentages of 4·0, 12·6, 24·8, and 60·7 (Banjoewangi). These facts of geographical distribution do not suggest that *X. astia* has any influence on the epidemiology of plague in Java. With regard to the theory of import of *X. astia* by sea, its absence from the large seaport Batavia and also from Passoeroean requires explanation. Attention is drawn to the fact that although *X. astia* has been found in nature only in the hot and moister climate of the coast of Java it has lived on a house-rat in a laboratory in Bandoeng at a height of 700 metres for a year; and this supports the inference that it may come to light in the inland of Java sooner or later. The author indeed appears to think that climate and season have some influence on the sporadic distribution of this species in Java.

Of fleas taken from 974 house-rats and 275 house-shrews in the coast zone of Java 2,279 were *X. cheopis* and 590 were *X. astia* (also 1 *Ct. felis*). *A. Alcock.*

i. Kopstein (Felix). De biologie van de Huisspitsmuis Pachyura Murina (L.) en hare beteekenis voor de epidemiologie der builenpest op Java. [**The Biology of the House Shrew (*Pachyura murina* L.) and its Significance for the Epidemiology of Bubonic Plague in Java.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Sept. 27. Vol. 72. No. 20. pp. 1337–1349.

ii. Schuurman (C. J.). Eenige opmerkingen naar aanleiding van twee artikelen van Kopstein op het gebied der pest-epidemiologie. [**Comment upon Two Articles by Kopstein, Concerning the Epidemiology of Plague.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Sept. 27. Vol. 72. No. 20. pp. 1350–1358.

i. The author relates the results of a survey of over 10,000 houses in Java in places where *P. murina* was found besides *M. rattus*. The shrew was found to nestle exclusively in native villages outside as well as inside the native dwellings. It is more often found on the ground level than in higher parts of the house, never in the roof. It very rarely leaves the villages for the open field.

About 46 per cent. of them are flea carriers, the most common flea being *X. cheopis* (average flea index 1·7). These figures are lower than those of *M. rattus*. As a transmitter of fleas among rats the shrew may play a part, but it has relatively little contact with man. In the spread of plague from village to village it has apparently no practical significance.

ii. Schuurman's article is a polemic one which cannot be summarized in detail. He does not agree with Kopstein as regards the relative numbers of shrews and rats in the villages nor as regards the changes in density of shrew population (which he would take as indicating active migration of the animals). He also found a much higher flea index. *W. J. Bais.*

FONQUERNIE (J.). Essais de traitement de la peste par le bactériophage. [**Treatment of Plague by Bacteriophage.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 677–678.

The article gives details of five cases of plague which were treated ineffectually with bacteriophage. This administration was intrapulmonary, subcutaneous, intravenous, intramuscular and oral.

W. F. H.

RAO (B. R. Ranganatha). **Three Cases of Plague treated with "Bayer 205."**—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. p. 626.

None of the three cases had been inoculated against plague. The treatment consisted of an intravenous injection of 0·9 gm. "Bayer 205" in 10 cc. distilled water. The first two cases recovered rapidly and the third also recovered with some delay. *W. F. H.*

LEGENDRE (F.). Sur un cas de diagnostic de peste par examen du sang. [**Plague diagnosed by Blood Examination.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. p. 1012.

A patient was having his blood examined for malaria parasites shortly before his death. The smears, however, showed the blood to be swarming with plague bacilli and the case was obviously one of agonal septicaemia. The author calls attention to the dangers which may result to the investigator and others from such cases. *W. F. H.*

DE SMIDT (F. P. G.). **Nairobi Plague Prophylactic: Further Notes on Preparation and Potency.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Nov. Vol. 9. No. 8. pp. 227–236.

Many useful laboratory details are given of the preparation and immunizing value of variously treated plague vaccine. The incubation of cultures continuously at 30°C. for six weeks yields a vaccine superior to that with incubation partly at 30°C. and partly at the variable atmospheric temperature of Nairobi for a total of 12 weeks. Immunizing potency of a vaccine is diminished by heating at 55°C. for 1 hour, and almost destroyed by heating at 100°C. for the same period. A comparison of the immunities produced by small and large doses of vaccine suggested that this was not high for the latter, considering the extra toxicity of the large dose. Intraperitoneal inoculations could be depended on to be invariably successful in affording rat spleens containing plague bacilli, which are used in inoculating vaccine cultures. This was not the case with subcutaneous injection.

W. F. H.

BUCHANAN (George S.). La préparation du vaccin antipesteux à l'Institut Lister. [**Preparation of Plague Vaccine at the Lister Institute.**]—*Bull. Office Internat. d'Hyg. Publique.* 1932. Oct. Vol. 24. No. 10. pp. 1626–1630. With 2 diagrams.

When it is grown at 37°C. instead of at 26°C. or even 30°C. the plague bacillus develops a gelatinous envelope and it would seem that this gelatinous material is the most important antigen of immunization [see this *Bulletin*, Vol. 29, p. 676]. Quite possibly Haffkine's broth vaccine, as manufactured in Bombay, would be improved by cultivation at this temperature. In the Lister Institute the Bombay vaccine was found to be certainly superior to a vaccine prepared from cultures on agar. Another vaccine altogether, which is regarded as of high prophylactic power and non-toxic, is the lysate of plague bacilli produced by a suitable bacteriophage. *W. F. H.*

i. GRAHAM. Enquête sur les résultats de la vaccination antipesteuse. La vaccination antipesteuse dans un district du Pendjab. [**Enquiry into the Results of Plague Vaccination in a District of the Punjab.**]—*Bull. Office Internat. d'Hyg. Publique.* 1932. Oct. Vol. 24. No. 10. pp. 1606–1609.

ii. BOYÉ. Les résultats des vaccinations antipesteuses dans les colonies françaises. [**Results in the French Colonies.**]—*Ibid.* pp. 1610–1622.

iii. STOCK (P. G.). Résultats de la vaccination antipesteuse dans l'Union de l'Afrique du Sud. [**Results in S. Africa.**]—*Ibid.* pp. 1623–1625.

In these communications further replies to a questionary [see this *Bulletin* Vol. 29, p. 674] are given. Some of these may be picked out.

i. Among 20 villages in the Punjab with populations varying from 170 to 3,100 there was not a single case of plague among vaccinated persons in fourteen, whilst the morbidity among non-vaccinated ranged from 4·27 per cent. up to as much as 56 per cent. Most of the cases of plague in the vaccinated had no fever. The author concludes that plague vaccination is of great value.

ii. Among 237 patients in hospital and treated identically there were 128 vaccinated and 109 non-vaccinated with mortalities of 37·5 and 52·2 per cent. respectively.

In the report of the Director-General of Health in Indo-China a number of instances are cited, where vaccination appeared to be efficacious. Stress is laid upon the use of the word "appeared" because interpretations might differ regarding the facts. An example is given and the qualifying remark is made: "If the effect of vaccination was truly a positive one then the duration of the immunity must have been short, seeing that less than three months after their inoculation the inhabitants had again become susceptible." Again the author writes: "It is very difficult to draw any conclusions from the reports of Senegal: certain facts tend to prove that the vaccine has only a very doubtful efficacy."

iii. Prophylactic vaccine has been used in S. Africa on a rather large scale. The results have not been conclusive. *W. F. H.*

TAYLOR. Enquête sur l'efficacité de la vaccination antipesteuse. Deuxième réponse de l'Institut Haffkine de Bombay. [**Anti-Plague Vaccination Inquiry. Second Report from Bombay.**]—*Bull. Office Internat. d'Hyg. Publique.* 1932. Nov. Vol. 24. No. 11. pp. 1813–1860.

The vaccine used is a broth culture of 4 weeks' incubation at 26·6°C., sown with a virulent strain of *Past. pestis* and killed by heat followed by the addition of phenol. The ordinary statistics of plague, inasmuch as they do not furnish information of the comparative degree of risk to which the vaccinated and the non-vaccinated population has been subjected are almost valueless. The statistics, on the other hand, of special vaccination campaigns have, according to the author, a true statistical value. Careful details are given of these at very considerable length. They are summarized in Table XVIII (slightly modified) and the conclusion is drawn that vaccination diminishes the chances of contracting plague 4 times and the chances of dying by 8 times. *W. F. H.*

Recapitulation of statistics of epidemics for which reliable and comparable data exist.

Epidemics	Population		Vaccinated		Non-vaccinated	
	Vaccinated	Non-vaccinated	Cases	Deaths	Cases	Deaths
Reformatory at Byculla (1897)	147	172	2	—	12	6
Lanowli (1897)	323	377	14	7	78	57
Umerkhadi prison (1898)	147	127	3	—	10	6
Undhera (1898)	71	64	8	3	27	26
Hubli (1898) ...	24,631	17,786	lacking	338	lacking	2,348
S.M.R. Hubli (1898)	1,260	760	11	2	35	21
Belgaum (1899)	4,842	4,558	78	40	506	346
Jewish Community at Aden (1900)	1,190	982	23	8	83	65
Nawashahr (1900)	2,648	2,141	9	5	41	32
Kahma (1900) ...	863	889	—	—	10	5
Khatkar Kalan (1900)	1,040	338	6	2	6	5
Salem (1910) ...	27,489	27,181	434	226	1,693	1,495
Coimbatore (1913–14) ...	26,559	22,604	150	56	707	492
Bagdad (1919) ...	56,555	108,445	65	36	806	638
Totals	147,765	186,424	—	723	—	5,542
Totals (Hubli excluded) ...	121,134	168,638	803	385	4,014	3,194

Panayotatou (Angélique). Sur une épidémie de peste à l'île de Poros (Grèce) en 1837 (d'après les notes du calendrier d'un médecin de l'époque). [**An Epidemic of Plague in Poros in 1837.**]—*Rev. Prat. Malad. des Pays Chauds.* 1932. Feb. 11th Year. Vol. 12. No. 2. pp. 60–62.

Even at this early time the method of disinfecting persons suspected of plague and their effects was, very reasonably, by means of chlorine water. The fear which the epidemic inspired is manifest in the action of the members of committee deputed to conduct the inspection who, armed with two pistols, examined the axillae and the buboes with the pointed end of a cane. *W. F. H.*

JETTMAR (H. M.). Pestprobleme in der Mandschurei. [**Plague in Manchuria.**]—Reprinted from *Wien. Med. Woch.* 1932. No. 19. 10 pp.

This is an epidemiological study of plague, which covers the ground of the animals infected in nature, the carry-over of plague in the winter months and the difficulties of the plague campaign. *W. F. H.*

ANNALES DE MÉDECINE ET DE PHARMACIE COLONIALES. 1932. Jan.–Feb.–Mar. Vol. 30. No. 1. pp. 101–107.—La peste au Sénégal en 1930. Extrait du rapport annuel de M. le lieutenant-colonel PEYRE, chef du service de santé p.i.

DE LA TORRE (Francisco). Proyecto de profilaxis de la peste bubónica para la provincia de Córdoba.—*Semana Méd.* 1932. Sept. 1. Vol. 39. No. 35 (2016). pp. 610–614. With 1 map.

JOSEPH (Gaston). Mesures administratives prises au Sénégal et à Dakar contre la peste en 1931.—*Bull. Office Internat. d'Hyg. Publique.* 1932. Oct. Vol. 24. No. 10. pp. 1631–1633.

LAUZERAL (P.) & MILLISCHER (P.). A propos de la filiation de deux cas de peste, l'une à allure septicémique, l'autre à allure pneumonique.—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 935–941.

REYNAL (J.) & WASSILIEFF (A.). Prophylaxie de la peste à Tunis. La station municipale de surveillance murine : laboratoire du rat : son fonctionnement pendant une année (mai 1931–avril 1932).—*Arch. Inst. Pasteur de Tunis.* 1932. July. Vol. 21. No. 1. pp. 181–207. With 1 chart. [10 refs.]

CHOLERA.

JUDE (L. V. R.), MARTIN (L. H. D. H.) & MILLISCHER (P.). La défense des territoires du Levant placés sous mandat français, contre l'épidémie de choléra ayant sévi en Irak. (Juillet–Décembre 1931). **[Defensive Measures for French Mandated Territories against Cholera in Irak.]**—*Arch. Méd. et Pharm. Milit.* 1932. Dec. Vol. 97. No. 5. pp. 521–536. With 1 folding map.

The motor route by the desert from Baghdad to Damascus is now of the utmost importance in connexion with the spread of cholera. An epidemic of cholera broke out at Basra, which had a weekly incidence of 265, 294, 200, 142, 294, 354, 210 and 120 cases from 9th August to the 3rd October. It spread up the Tigris and Euphrates and down the Shatt-el-Arab. As a result of this generalization of the epidemic special precautions were taken in the French mandated territories. Investigation too was instituted into the subject of the healthy carrier and a surprising result was obtained. From the first several carriers were found, the majority coming from non-infected localities, presenting no symptom of illness and in possession of regular certificates of vaccination. Out of a total of 1,560 travellers 5·38 per cent. were declared carriers, but this percentage reached as high as 20 per cent. in one week. The carrier percentages had a degree of parallelism with the intensity of the epidemic. This high proportion led to the examination of all travellers without distinction and necessitated a great effort in organization. Most travellers arrived in the early morning; their stools were immediately cultured and 8 hours later all those with negative findings were immediately released from quarantine restriction. Suspicious cases and carriers were detained for 2 or 3 days and given cholera vaccine *per os* by Besredka's method. Their stools became rapidly free of vibrios. Success crowned the efforts made and the barrage was completely suspended when Iraq was declared free of infection. The method of examination was to make a culture of the stool in peptone water (pH 8·2) and incubate 8 to 10 hours. No pellicle has yet formed by that time, but fine strands of growth may be detected on the surface. Gram staining and examination for motility were then carried out and if all the tests were negative the traveller was released. If Gram-negative. motile vibrios were found, even in the absence of a surface growth pellicle, further testing was undertaken. Of the strains isolated some were sent to the quarantine laboratory at Alexandria and some to the Pasteur Institute in Paris where confirmation that they were cholera vibrios was obtained. [These findings raise many important questions, not only those of the identification of the cholera vibrio, agglutination tests and standard sera, but also whether these vibrios are pathogenic and if not, whether they may become so.]

W. F. Harvey.

BIFULCO (C.). Patogenesi del colera asiatico. Nota I. **[Pathogenesis of Cholera.]**—*Riforma Med.* 1932. Aug. 27. Vol. 48. No. 35. pp. 1323–1326, 1329.

·Difficulty has always been experienced in producing anything like the true cholera syndrome in animals. The author has succeeded in overcoming this difficulty by injecting a suspension of cholera vibrios into the superior mesenteric vein of rabbits and thus approaching the liver by the portal circulation. In this way there is little loss in concentration of the vibrio dose. The result is markedly different from that obtained when injections are made into the ear vein, into the heart or into the peritoneum; in fact an attack of cholera is produced similar to that seen in man. The liver therefore is highly important in the pathogenesis of cholera. The vibrios are brought into association with the liver cells in a functional sense, which is not the case with introduction into the general circulation. Their activity is exalted and they are passed into the intestine by way of the bile to set up the characteristic cholera syndrome. *W. F. H.*

GOHAR (M. A.). **Some Observations on the Haemolysin and Toxin of Cholera and Related Organisms.**—*Zent. f. Bakt.* I. Abt. Orig. 1932. Oct. 25. Vol. 126. No. 1/2. pp. 61–68.

In the group of cholera and cholera-like vibrios, taken as a whole, the individual members or strains may be non-haemolytic or they may be more or less haemolytic. The cholera vibrio is a non-haemolytic, non-toxic organism, while the El Tor vibrios, which are closely related to the cholera vibrios biochemically and serologically, are both strongly haemolytic and productive of an exotoxin. This work is in the main a study of the conditions under which haemolysin is produced and of its relation to exotoxin.

It is known that true cholera vibrios, although non-haemolytic, produce a halo of clearing around colonies on a blood agar plate. The same sort of halo is produced by the haemolytic vibrios if grown anaerobically, that is to say, under unfavourable conditions. It is suggested from this that the true cholera vibrio is not absolutely non-haemolytic but that it produces a small amount of haemolysin. With the aid of concentration methods and freshly isolated strains this was found to be probable. The relationship of haemolysin and exotoxin is considered to be very close: in fact they are regarded as one and the same. Highly haemolytic vibrios, therefore, produce a powerful exotoxin and non-haemolytic vibrios no exotoxin. It seems likely that the phenomenon of haemolysis by vibrios is due in the first place to affinity of the lipoid membrane of the erythrocyte for haemolysin. Lipoids or lipoid-containing tissues, such as cholesterol, suprarenal tissue and cerebral tissue are capable of adsorbing considerable amounts of haemolysin, whereas kaolin and neutral fats are not. With adsorption by lipoids the toxin and haemolysin of cholera-like vibrios are rendered atoxic and non-haemolytic. The evidence, although not wholly conclusive, is then very suggestive of the identity of vibrio haemolysin and vibrio exotoxin. The objection that an old haemolytic vibrio may lose its toxicity and yet remain haemolytic is discussed. It still retains, however, the power to confer immunity against the toxin, which points rather to a "degradation in the quality of toxin than actual loss of the power of its production."

W. F. H.

GOHAR (M. A.). **A Serological Study of *V. cholerae* and Related Vibrios.** —*Brit. Jl. Experim. Path.* 1932. Aug. Vol. 13. No. 4. pp. 371–379. [Summary appears also in *Bulletin of Hygiene.*]

Of 45 strains examined 35 gave the typical biochemical reactions of cholera, and of these latter 23 were haemolytic and 12 non-haemolytic. More detailed investigation of the antigenic structure of the test strains showed that true non-haemolytic cholera vibrios all possessed the same flagellar and somatic antigen. The cholera-like organisms may possess either flagellar or somatic antigen in common with the cholera vibrio and require an absorption test for their differentiation. None of the haemolytic vibrios of the series examined possessed antigen identical with the cholera vibrio. *W. F. H.*

ZIMMERMANN. Untersuchungen zur Cholera-El-Tor-Frage. [**The Cholera-El Tor Question.**]—*Zent. f. Bakt.* I. Abt, Orig. 1932. Vol. 127. No. 1/3. Beiheft pp. 146*–149*.

The author shows clearly how important it is to establish controls upon the production of haemolysis by vibrios. The composition of the culture medium is especially important. Under strict conditions of testing the great majority of the strains labelled cholera never showed haemolysis, while in the same way almost all the El Tor strains produced a strong haemolysin. *W. F. H.*

GOYLE (Amar Nath) & GUPTA (P. N. Sen). **Notes on Spontaneously Agglutinating Strains of** *V. cholerae* **both Natural and Artificially Produced.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 35–41. With 3 figs.

The authors describe a form of *V. cholerae* obtained by the methods used to effect dissociation. This form, although it did not produce characteristic rough colonies on agar, was nevertheless spontaneously agglutinable. They suggest that roughness "may sometimes only be shown by serological investigation." *W. F. H.*

YU (H.) & CHEN (K. F.). **A Suggestive Skin Test for Susceptibility to Cholera.**—*Chinese Med. Jl.* formerly *Nat. Med. Jl. China.* 1932. Aug. Vol. 46. No. 8. pp. 799–805. [11 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The toxic material used in test was obtained from specially selected cultures of the cholera vibrio whose virulence had been raised by animal passage. It was shown that the presence of glucose in the nutrient medium interfered with the production of toxic substance and a buffered broth without glucose, with an initial pH 8·4, was finally used. After 6 hours incubation the culture was centrifuged at high speed and the supernatant liquid filtered through a Berkefeld N candle. This filtrate was still lethal to guineapigs in a dose of 5 cc., after heating for one hour at 80°C. In the skin tests it was found that rabbits gave a negative or positive skin reaction with the toxic filtrate according as they had or had not been immunized previously with cholera vaccine. In human beings also a skin test carried out on unvaccinated and vaccinated persons, by injecting intradermally 0·1 cc. of toxic filtrate, gave positive and negative reactions respectively. Persons vaccinated two and even three years previously still gave negative skin reactions, from which it would seem that the intradermal cholera test may be a very delicate indicator of the duration of immunity. "Further study may prove the value of the skin test as a method of testing individual susceptibility to cholera." *W. F. H.*

HURI (Maurice). Etude d'un vibrion (*n. sp.*) isolé à Damas (Syrie), dans dix-neuf cas de diarrhée chez l'homme. [**A New Vibrio isolated at Damascus from Nineteen Cases of Diarrhoea.**]—*C. R. Soc. Biol.* 1932. Dec. 2. Vol. 111. No. 37. pp. 678–680.

In these cases the diarrhoea was abrupt in onset, accompanied by violent colic, and the stools were as many as 20 daily. It gradually subsided but remained for several weeks. Smears showed a regular feltwork of vibrios. These possessed usually single cilia and were not to be found in stream and well water. A very fine pellicle was formed in peptone water culture. The nitroso-indole reaction was feeble or absent. Other cultural characters were that it did not coagulate milk, did not change the colour of litmus milk, did not show any proteolytic character and did not liquefy gelatin. It was not haemolytic and did not agglutinate with cholera serum. In only one case was it possible to test the patient's own serum, which agglutinated his own vibrio at 1 in 350. This same serum agglutinated two of the other isolated strains at 1 in 100 and 1 in 150. *W. F. H.*

VEDDER (A.) & VAN DAM (W.). De beteekenis der pH voor de rijping en electiviteit van cholera-voedingsbodems. [**The Importance of the pH for the Ripening and Selectivity of Cholera Nutrient Media.**]—*Nederl. Tijdschr. v. Hyg. Microbiol. en Serol.* 1932. Vol. 7. No. 2. pp. 147–164.

—— & ——. Studien ueber Elektivnährböden für Choleravibrionen. I. Mitteilung: Die Ursachen der Elektivität und Reifung des Dieudonné-Nährbodens. [**The Cause of the Selectivity and Ripening of Dieudonné Medium.**] II. Mitteilung: Neue Elektivnährböden für die Choleradiagnostik. [**New Selective Media for Cholera.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Oct. 25 & Dec. 15. Vol. 126. Nos. 1/2 & 5/6. pp. 145–152. [14 refs.]; 450–455. [13 refs.]

The usefulness of the highly alkaline Dieudonné medium for the isolation of cholera vibrios from stools in more or less pure culture is a well established fact. Two theories, which may be described as the loss-of-ammonia and the action-of-carbon dioxide theories, have been invoked to account for the ripening of the medium. Three stages of transformation occur in Dieudonné medium, (1) of immaturity or unripeness, (2) of ripeness and selectivity for the cholera vibrio to the exclusion of other organisms and (3) of ripeness without selectivity, when *Bact. coli*, *Bact. faecalis alkaligenes* and other intestinal organisms will grow on the medium just as well as *V. cholerae*. It is probable, from the authors' experiments, that both the current theories accounting for ripening are to some extent true, with greater importance attributed to the carbon dioxide than to the ammonia theory, but that the entire explanation is one of attainment of a selective or non-selective pH upon exposure of the plate for a definite time to the air. Above pH 9·6 the plate is unsuitable for any growth: between 9·6 and 9 it is selective for *V. cholerae* and below 9 it is non-selective. *W. F. H.*

VEDDER (A.) & VAN DAM (W.). Nieuwe electieve voedingsbodems voor het Cholera-onderzoek. [**New Selective Media for Cholera.**]—*Nederl. Tijdschr. v. Hyg., Microbiol. en Serol.* 1932. Vol. 7. No. 3. pp. 197–205.

The chemical basis underlying the selectiveness and ripening of the well-known Dieudonné cholera medium depends on attainment of a pH ,9 to 9·6 [see above]. With this knowledge it became an easy matter to prepare media which possessed all the advantages and none of the disadvantages of the Dieudonné medium. They can be used immediately. These media are prepared as follows :—

No. 1.—(1) Boil for some minutes, haemoglobin 1 gm., N/5 KOH 20 cc. and obtain as much solution as possible. (2) Cool under the water tap. (3) Add 120 mgm. glycocol and 80 cc. of melted and cooled peptone agar (Witte peptone 1 gm. ; sod. chloride ½ gm. ; agar 3 gm. ; water 100 cc.). (4) Pour plates. (5) Sow immediately without drying.

No. 2.—(1) Triturate 1 gm. haemoglobin with 4 cc. N/1 di-pot. carbonate (Anhydrous salt 6·9 gm. ; boiled distilled water 100 cc.). (2) Add 1 cc. N/2 pot.-hydrogen carbonate solution (5 gm. per 100 cc. boiled distilled water) and 10 cc. distilled water. (3) Add 35 cc. peptone agar. (4) Pour plates.

Plates made from these media are immediately ripe and selective. They give abundant growths of *V. cholerae* and *V. El Tor.* Other organisms such as *Ps. pyocyanea, Bact. faecalis alkaligenes, Bact. coli* and enterococcus do not grow. *W. F. H.*

PASRICHA (C. L.), DE MONTE (A. J.) & GUPTA (S. K.). **Cholera and Cholera-like Vibriophages.**—*Indian Med. Gaz.* 1932. Sept. Vol. 67. No. 9. pp. 487–490. With 3 figs.

In a former publication (this *Bulletin*, 1932, p. 684) new types of phages D and E were reported and F was suggested. In this paper, which is on similar lines, the characters of phage E are described. It has the reciprocal action of the other four types, that is to say : " It can lyse the secondary growths of vibrios resistant to the other types of choleraphage and the secondary growth which develops after the action of type E on cholera vibrios is lysed by the other four types of choleraphage." Freshly isolated phage E had only very limited virulence for ultra-pure smooth vibrios. Of 50 strains of cholera vibrio tested against this phage only 4 were lysed. The number of strains, however, which were lysable was increased by adapting this type E to non-lysable strains and its virulence was easily raised by passage. It could only be obtained pure and separate from type A by serial passage on an ultra-pure rough vibrio on which type A cannot be propagated. Therapeutic choleraphage is improved by the addition of the new type.

Not only are pure-line types of choleraphage investigated by the authors but also the important group of cholera-like phages. Eight of these, active against vibrios which were non-agglutinable by cholera serum, non-lysable by choleraphage, were isolated. A classification of vibrios is put forward based on (1) their source from cholera stools, other stools and from water, (2) their agglutinability and (3) their lysability. This is admittedly an arbitrary classification, but helps to give precision to descriptions of changes which under selective conditions of growth may take place in a vibrio, such as the transformation from non-agglutinating to agglutinating or from phage-sensitive to phage-resistant. The series of choleraphages here considered is divisible into the type A and E which lyse only agglutinating cholera vibrios and the types B, C, D, which are capable, in addition, of lysing some strains of non-agglutinable vibrios. The reasoning is complicated, with this as one of the conclusions, that the true cholera vibrio does not die out when shed but loses its agglutinability and may be isolated from natural waters as a non-agglutinable vibrio Other conclusions have reference to contamination of vibrios with phage, liberation of a symbiotic phage by the action of another powerful phage and to phages found in Nature being mutation forms of choleraphage types capable of reversion. *W. F. H.*

CHEN (W. K.). **Dissociation of *V. cholerae* by Bacteriophage.**—*Proc. Soc. Experim. Biol. & Med.* 1932. June. Vol. 29. No. 9. pp. 1160–1162. With 4 figs.

The technique used was to transfer 1 cc. of an 18-hour peptone water culture to fresh peptone water to which 0·5 cc. bacteriophage had been added and incubate for one week. This process was repeated at weekly intervals and the culture plated out for examination of the resulting colonies. Variants appeared from among the phage-resistant secondary colonies after 2 to 4 weeks, 4 to 6 weeks and 6 to 10 weeks, which were motile-rough, non-motile-smooth and non-motile-rough colonies respectively. All these variants showed a tendency to reversion when grown in peptone water with transfer twice daily for 30 days and this reversion was still more rapid by animal passage.

W. F. H.

RAO (R. Sanjiva). **The Influence of H Ion Concentration on Cholera Bacteriophagy. A Preliminary Note.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 377–385. With 16 plates.

Of the types into which bacteriophage has been divided, type A is quick acting and attacks only smooth cholera strains while types B and C are comparatively slow in action but dissolve both rough and smooth strains. According to the author, lysis by type A bacteriophage is enhanced within the optimum limits by increasing acidity and that of the type B by increased alkalinity. If there is no sharp line of demarcation between smooth and rough vibrios, it is understandable how an alteration of the pH of the medium in which they are grown may alter the grade of roughness of a vibrio and bring it into the category of one lysable by a subtype of A phage. In an alkaline medium the experiments given indicate that "cholera vibrios tend to arrange themselves in different groups according to their lysability by . . . the A type of cholera bacteriophage. It is then logical to presume that the different groups of cholera vibrios are only different grades of roughness." This is a very important conclusion and the author wisely remarks that further work is required to establish it.

W. F. H.

JUDE (René) & MILLISCHER (Pierre). Au sujet de la stérilisation des porteurs de vibrions cholériques par la voie buccale. [**Sterilization of Cholera Carriers Orally.**]—*C. R. Soc. Biol.* 1932. Oct. 21. Vol. 111. No. 31. pp. 263–264.

The authors describe their treatment of cholera carriers with vaccine in a dose of 5 to 6 cc. and concentration 5,000 million per cc. by the mouth as being probably more rapid in its effect than small doses of calomel. They desire that their results should be confirmed.

W. F. H.

HURI (Maurice). Essai de stérilisation des porteurs sains de vibrions cholériques par la méthode de Besredka. [**Sterilization of Healthy Cholera Carriers by Besredka's Method.**]—*C. R. Soc. Biol.* 1932. Dec. 16. Vol. 111. No. 39. pp. 877–878.

The development of automobile and air services across the desert of Damascus from Iraq has resulted in the arrival there of numerous carriers. Trials have been made at the quarantine station of the best methods to deal with such cases. The usual method had been to administer 0·20 gm. calomel at 48 hours interval and this took 3 to 5 days to effect sterilization. An account may be given of the first of three trials made: On the 11th September 13 cholera carriers out of 76 travellers were diagnosed by identification of the vibrios isolated, which were agglutinable to high titre with Pasteur Institute serum. Three of these received 10 cc. *per os* anticholera virus prepared from vibrios obtained from the Iraq epidemic. Another three received 10 cc. heated vaccine after preliminary ingestion of a capsule of bile; still another three received vaccine without bile, while four were kept as controls. All of those treated, whether with antivirus or vaccine were free of cholera vibrios in 24 hours, but agglutinable vibrios were present in the stools of all the controls. These four controls were now tested one by one and on successive days with antivirus, vaccine with bile and vaccine without bile, again with successful sterilization in 24 hours; the fourth control only still remained a carrier and was freed from vibrios finally by administration of antivirus. The sum total of carriers in the three trials was 74 and the results for these are the same as those recounted. *W. F. H.*

LEIVA (Lamberto). **Bactericidal Action of Di-Hydranol in Human Cholera Carriers.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 509–512. With 2 figs.

Four daily successive negative examinations of stools after the last positive result are required before a carrier is allowed to be discharged. The number of cases available was 70 but two of these remained positive for over a month in spite of treatment and are excluded from consideration. Of the 68 remaining 32 received treatment with di-hydranol and 36 with salol-urotropin. For intervals of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 days between the last positive and the first negative examination, di-hydranol furnished 3, 9, 6, 5, 3, 0, 2, 1, 1, 1, 1 and salol-urotropin 6, 4, 10, 12, 3, 0, 0, 0, 1, 0, 0 cases respectively. The author considers that di-hydranol is a drug that is of service, ranking favourably with the salol-urotropin treatment in sterilizing cholera carriers. *W. F. H.*

KOROBKOVA (E.). Sur la cytologie du vibrion cholérique.—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 4. pp. 335–342. With 37 figs. on 2 plates. [In Russian. French summary pp. 343–345.]

MEDICAL ZOOLOGY.

NYASALAND PROTECTORATE. **Medical Entomologist's Report for 1931** [LAMBORN (W. A.)].—*Nyasaland Protectorate Ann. Med. Rep. on Health & San. Condition for Year ending 31st December, 1931.* Appendix I. pp. 1–20.

This is a fine record of varied, purposeful, and prescient work.

1. *Tsetsefly Control.*—Steady improvement is reported in the Dowa and Fort Manning Districts of the Northern Province, where economic development by natives and Europeans of country formerly menaced by fly goes on apace, there being now 500 native tenants and extensive cultivation of tobacco and maize. Settlement is also going on along the trunk road, a large tract there being now a native reserve, and the number of Indian traders—indicative of prosperity—having increased to 200; the cultivation of tobacco is gradually leading to deforestation, and game is becoming scarce. Losses of stock south of the fly area certainly have occurred and have been said to be due to trypanosomiasis—a doubtful diagnosis. Experiment has shown that the flytraps found so useful against *Glossina pallidipes* in Zululand by HARRIS are of little value against *G. morsitans* which attacks its victims' flanks, nor did modifications of that trap improve matters.

2. *Research on the possibility of the transmission of trypanosomes (and other parasites) by carriers other than Glossina.*—Preparatory work in this direction has been fruitful in interesting and useful observations upon distribution, biology, and bionomy of various blood-sucking flies, the detail of much varied observation being tabulated in subject classifications that occupy 13½ foolscap pages. In the course of these investigations the author obtained a long series of egg-masses of *Tabanus biguttatus*, from most of which he bred out a minute parasitic Proctotrypid Hymenopter. He also succeeded in inducing this and eight other species of Tabanus to deposit their eggs in captivity, and thus obtained a volume of novel data on their bloodsucking habit in relation to reproduction. Eggs of *Haematopota decora* (which has a tapering abdomen) were observed to be planted well down in the ground. The author also succeeded in getting series of several species of Tabanus that had bitten animals (mostly cattle) carrying *Trypanosoma congolense* to feed on other healthy animals (dogs, white rats and a baboon) at intervals of 5 to 50 days afterwards. In exploring other possible ways for conveyance of that infection he introduced the excreta of such flies (passed while they were feeding on their bites) into the mouths of experimental animals—but without any result in 3 sets of experiments. And furthermore in a series of forty of such flies he examined microscopically smears from every region of the alimentary tract; the smears for the most part were negative; but (*a*) in the hindgut of a few of the flies swarms of organisms were found and were determined by Prof. J. Gordon THOMSON as Crithidia; (*b*) in another instance "a flagellate with a truncated end like a Leptomonad; and (*c*) in the proboscis of a Tabanus eleven small nematodes. Similar experiments were conducted with regard to possible conveyance of infection with *Trypanosoma congolense* by *Stomoxys calcitrans*—without positive result. Furthermore, in some preliminary and incomplete experiments the author satisfied himself that for experimentation such as is related above, Lyperosia could be kept alive up to 14 days and Haematopota is as amenable as Tabanus.

The author having observed that the larvae and puparia of *Tabanus africanus* on the Shire river are, like the larvae and pupae of Mansonioides, associated with the water-lettuce, *Pistia stratiotes*, tried whether this baneful plant could not be converted to beneficial uses—as it is in China and the Malay States—as food for pigs, and he found that two native pigs brought from the Angoni highlands consumed it readily once they had become accustomed to it. *A. Alcock.*

STABLER (Robert M.). **An Extended Study of Variations in a Single Race of a Coli-like Amoeba and its Bearing on the Specificity of** *Councilmania lafleuri.*—*Amer. Jl. Hyg.* 1932. July. Vol. 16. No. 1. pp. 1–31. With 7 text figs. & 24 figs. on 2 plates. [39 refs.]

The author has had under observation for 18 months a case of *Entamoeba coli* infection. In this case the amoeba has been exhaustively studied during the period, 507 stools having been examined and over 500 prepared slides and over 600 fresh mounts made. The main fact disclosed by this investigation is that the amoeba revealed all the morphological variations characteristic of both *Entamoeba coli* and *Councilmania lafleuri*. Buds and chromophile ridges supposed to be characteristic of *C. lafleuri* could be made to appear at will on the fixed and stained slides, the type and temperature of fixation being responsible for their production. For reasons given by the author there is no doubt that the case was infected with a pure strain of *Entamoeba coli*. On this account, as studies by other workers have already shown, the name *Councilmania lafleuri* may be correctly regarded as one of the many synonyms of *Entamoeba coli.* *C. M. Wenyon.*

SEGAL (Bess E.). **Budding and Other Variations in** *Endolimax nana*; **a Comparison with** *Councilmania tenuis* **Kofoid, 1928.**—*Amer. Jl. Hyg.* 1932. May. Vol. 15. No. 3. pp. 741–750. With 29 figs. on 2 plates. [10 refs.]

In 1917 KUENEN and SWELLENGREBEL described and figured two amoebae of the human intestine. These were *Entamoeba tenuis* and *Endolimax intestinalis*. It is generally assumed that the first of these was a small race of *Entamoeba histolytica* and the second *Endolimax nana*. KOFOID (1928) came to the conclusion that he had rediscovered *E. tenuis*, redescribed it and transferred it to his genus *Councilmania* as *C. tenuis* because he had observed bud formation through an opening in the cyst wall, a feature which is characteristic of the supposed genus. *C. tenuis*, however, as described by KOFOID does not resemble *E. tenuis* of KUENEN and SWELLENGREBEL, as KOFOID supposed, but rather their *E. intestinalis*, so that it seems not impossible that KOFOID confused some of the figures in KUENEN and SWELLENGREBEL'S plate illustrating their amoebae. Be that as it may, the author of the paper under review, who points out these discrepancies, has studied ten cases of *Endolimax nana* infection, fixing the parasites by a variety of techniques. After certain methods of fixation a varying percentage of the cysts show " budding," so that an amoeba corresponding with KOFOID'S *Councilmania tenuis* is produced. The " budding " is not a biological process but merely the result of damage to the cyst wall and the consequent protrusion of a bud of cytoplasm through the opening thus formed. The other features attributed to *C. tenuis* fall within the variations of

Endolimax nana so that the inevitable conclusion is reached that KOFOID'S ***Councilmania tenuis*** not only is not KUENEN and SWELLENGREBEL'S *Entamoeba tenuis* but merely *Endolimax nana,* the cysts of which have been damaged by faulty technique. *C. M. Wenyon*

TATE (P.) & VINCENT (M.). **Susceptibility of English** *Culex pipiens* **L. to Infection with Bird Malaria.** [Correspondence.]—*Nature.* 1932. Oct. 22. Vol. 130 No. 328. p. 630.

In the course of experiments with 393 English *Culex pipiens* gorged on canaries heavily infected with bird malaria (*Plasmodium relictum*) 131 of the insects were dissected and 72 (55 per cent) were found to be infected—oocysts and salivary glands The infected insects readily transmitted the infection to healthy canaries *A. A*

PAINE (R W) **Coconut Committee. Entomological Report.**—*Ann. Bull Div Reps Dept Agric Fiji 1931* pp 1–6 [Summarized in *Rev Applied Entom* 1932 Nov Vol 20 Ser B Pt 11. p 237]

A colony of *Megarhinus splendens,* Wied , the larvae of which attack those of certain other mosquitos in tree-hole water, barrels, etc , was introduced from Java into Fiji at the end of February In Fiji it feeds principally on *Aëdes scutellaris,* Wlk (*variegatus,* Dolesch), the vector of filariasis In one small area of swamp land containing trees (*Inocarpus edulis*) it became well established, causing a reduction of quite 50 per cent. in the numbers of *Aedes,* but in other localities with a less concentrated supply of suitable breeding-places it has not been so successful As oviposition does not occur on water on the ground, this mosquito cannot be expected to exercise any appreciable degree of control over *Culex* spp or *A* *vexans,* Mg "

HALL (W W) & VOGELSANG (W A) **Spider Poisoning : a Study of the Toxin of the Black Widow Spider** (*Latrodectus mactans*) —*U S. Nav Med. Bull* 1932 Oct Vol 30 No 4 pp 471–478. With 4 figs. on 2 plates.

A good study of the effects of the bite of the (female) " black widow," the venomous Theridiid spider *Lathrodectus mactans* It begins with summaries of two cases of bite, one of the thumb the other of the penis The characteristics of the bite are (1) severe local pain, without any local inflammatory swelling but afterwards spreading severely and widely with soreness and numbness or spasm and tetany, and (2) wherever the infliction of the bite may be, pain (often excruciating) and rigidity of the abdomen—a condition often simulating acute appendicitis or a ruptured gastric or duodenal ulcer Macerated spiders injected ***subcutim*** into guineapigs gave negative results. Guineapigs bitten by a female spider usually flinched and squealed, the abdomen became tender and rigid, uncontrollable spasmodic movements of the legs began and increased in intensity, and were followed by noisy and difficult breathing, which in severe cases ended in pulmonary oedema. These symptoms began in from 1 to 5 minutes up to half-an-hour after the bite and ran their course in from 1 to 5 hours, after which the animal either succumbed or began to improve. During the second 24 hours painful movement (pseudoparalysis) was marked. Experimental animals dying within 5 hours showed only pulmonary oedema; those bitten on the abdomen and succumbing after 48 to 72 hours showed patches of necrosis in liver, kidneys, spleen and adrenals. A single bite established complete immunity; subsequent bites caused no symptoms other than a local slough. But immune serum (antitoxin) protects only when given immediately after the bite; given later it does not seem to alter the ordinary course of reaction. The authors call the toxin "a non-haemolytic neurotoxin, which apparently acts on nerves and nerve-endings." [For earlier references to this and other species of the venomous genus *Lathrodectes* see this *Bulletin*, Vol. 19, pp. 497, 846; Vol. 20, p. 801; Vol. 21, p. 169; Vol. 23, p. 875; Vol. 24, pp. 401, 402, 895–897; Vol. 26, pp. 278, 779; Vol. 27, pp. 362, 935; Vol. 28, pp. 541, 542.] *A. A.*

DE ASIS (Cesareo). **The Bite of** *Latrodectus hasseltii.* [Correspondence.]—*Med. Jl. Australia.* 1932. Sept. 10. 19th Year. Vol. 2. No. 11. pp. 345–346.

The writer—from Cagayan in the Philippines—states that the venomous Theridiid spider *Latrodectus hasseltii* in the southern islands, as in Australia and New Zealand, is a species that commonly attacks man. The symptoms of its bite are profuse perspiration, high blood pressure, rapid and laboured respiration, slow pulse, numbness and weakness and paralysis of the lower limbs, and in some cases vomiting, chills, and dizziness. The alarming cases he treats with a 25 per cent. solution of $MgSO_4$ in 10 cc. doses *intravenim*, repeated as necessary. The spider, known in the Philippines as *aloy*, is a small black creature with a red back. *A. A.*

HASE (Albrecht). Ueber die unterschiedliche Widerstandsfähigkeit der parasitären Hauswanzen *Cimex lectularius* und *Cimex rotundatus* gegenüber der Einwirkung von Äthylenoxyd; nebst Bemerkungen üeber die Wirkung von Äthylenoxyd auf Meerschweine. [**On the Distinctive Resistance of the Parasitic Bedbugs** *Cimex lectularius* **and** *Cimex rotundatus* **to the Action of Ethylene-oxide; with Remarks on the Action of Ethylene-oxide on Guinea-pigs.**]—*Ztschr. f. Parasitenk.* 1932. Jan. 28. Vol. 4. No. 2. pp. 369–386. With 2 text figs. [7 refs.]

In all the series of experiments described in prodigious detail in this paper on the action of ethylene oxide (CH_2OCH_2) on bedbugs the concentration employed was 19·2 g./cbm. of ethylene oxide for 2–4 hours. From these experiments it appears that in the same concentration *C. rotundatus* is much more sensitive to ethylene oxide than *C. lectularius* and has a higher deathrate; that in all experiments certain larval stages of both species of Cimex were more resistant than adults of the same species, so that *C. lectularius* larvae are less sensitive than larvae of *C. rotundatus*; and that the eggs of *C. rotundatus* are less resistant than those of *C. lectularius.* Immediately after experimentation the bugs seemed to be unhurt; in the next 24 hours a large number of them seemed stupified, and after a further interval those so affected died.. Neither *C. lectularius* nor *C. rotundatus* nor the eggs of either species are destroyed immediately by the 2–4 hours action of ethylene-oxide in the given concentration, but a high mortality occurring in both species after the 4 hours action seems to indicate the extreme limit of endurance.

For guineapigs the action of ethylene oxide in the same concentration for two hours was near the fatal limit and at four hours a great many were killed. *A. A.*

ITO (Y.). Dermatitis linearis und Dermatitis arteficialis durch den Extrakt von " Paederus idae Sharp." **[Dermatitis linearis and Dermatitis artificialis from the Extract of " Paederus idae Sharp."]** —*Fukuoka-Ikwadaigaku-Zasshi* (*Fukuoka Acta Med.*). 1932. Aug. Vol. 25. No. 8. [In Japanese. German summary pp. 60–61.]

Dermatitis linearis, common in Kyushu in summer, is probably identical with the dermatitis caused experimentally by the intracutaneous injection of the irritant secretion (or irritant extract) of the [Staphylinid beetle] *Paederus idae* Lewis *vel* Sharp, since the symptoms of the two are identical, namely a local inflammation beginning with hyperaemia, papules, and vesicles going on to pustules and then gradually subsiding and ending in a week or two in pigmentation. The irritant extract is soluble in alcohol, chloroform, and ether, but with difficulty in water or normal saline ; it does not change in the course of ten months. *A. A.*

CHOPRA (R. N.) & CHOWHAN (J. S.). **Snake Venoms in Medicine.**—*Indian Med. Gaz.* 1932. Oct. Vol. 67. No. 10. pp. 574–578. [12 refs.]

The first part of this paper on Snake-venoms in Medicine takes four of the well-known Thanatophidia of the Oriental region from the natural history standpoint—their appearance, their geographical range, their venomous apparatus, and the physical, chemical, and pharmacological aspects of their venom. It is a good general presentation of current knowledge of *Naja tripudians, N. bungarus, Vipera russellii,* and *Echis carinatus,* and it need not detain us from the less formal and somewhat desultory final section headed " Therapeutic uses of the venom." Here we are informed that in India snake-venom is called *sarap vishi* in Hindi and *garala* in Sanskrit, that it is preserved for therapeutic use by drying or by rubbing with mustard oil and spreading on a plantain leaf, and that it is cobra venom that is chiefly used in the preparations of Indian physicians—in collapse, in cholera, in ascites, as an hepatic stimulant, and in small doses as a cardiac stimulant (although it is not absorbed from the gastro-intestinal tract or from other intact mucous membranes). In Mahomedan medicine cobra-blood is said to have a beneficial effect in leucoderma, and in Northern India a preparation of cobra and arsenic is a local application for syphilis. Turning to Western Medicine the authors note that rattlesnake venom has been much used in the treatment of pulmonary phthisis, acute pneumonia, chronic spasmodic cough, asthma, hoarseness, neuralgia, chorea, epilepsy, hystero-epilepsy, and haemophilia, and in other circumstances where a depressant action on nerve cells is desired. SPANGLER in Texas claimed that epilepsy could be cured by injections of snake-venom, since a few epileptics were so cured after rattlesnake bite ; the same practitioner also used intramuscular injections of the protein of rattlesnake-venom (crotalin) for non-specific desensitization therapy in allergic asthma, taking the degree of eosinophilia produced as a guide to dosage and to frequency of administration. Cobra-venom is said to afford a means of diagnosing malignant disease (Farmachidi's test), and venom of *Vipera aspis* to protect animals against the fixed virus of rabies (M. PHISALIX). There are Indians who habitually take small doses of snake-venom by the mouth [much after the method of Mithridates King of Pontus] with the idea of gaining immunity from poisons and diseases. The authors regard the use of cobra-venom by the mouth as baseless, and of rattlesnake-venom by injection, as a depressant of the central nervous system, as equally without justification. *A. A.*

ANDERSON (L. A. P.). **On the Standardization of Russell's Viper Antivenin.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 1–24.

As is stated in the Introduction, the standard Kasauli antiserum is prepared from the mixed venoms of the cobra and the daboia (Russell's viper) and is active against both ; and in the routine standardization of the Kasauli antivenin before issue only the neutralizing value against cobra venom is estimated. In the present paper methods of standardizing antidaboia serum by means of its neutralizing power *in vitro* and *in vivo* are described.

In the investigation of the minimum lethal dose of daboia venom, upon which standardization is based, earlier workers had noticed with regard to this venom, not only that individual samples appear to vary in their toxic effect but also that manifestations of toxic reaction, which appear chiefly in the vascular system, vary according to the dose and the route by which it is administered, causing on the one hand thrombosis and on the other hand haemorrhages. Thus LAMB and HANNA here quoted, state that when a dose that just fails to cause death from intravascular thrombosis is given intravenously the animal presents only very slight symptoms or none at all ; and in the author's own experiments on the neutralization of test-doses of daboia venom injected into muscles, either the death of the animal occurred almost immediately or no symptoms were observed. The uncertainties and irregularities that may follow intramuscular injection preclude this method from experimental determination of the minimum lethal dose, and for standardization of daboia antivenom—though not for estimation of its therapeutic value—it is necessary that in all tests both antivenom and venom must be injected intravenously so as to meet rapidly in the bloodstream.

The following are the author's conclusions :—

"(1) Methods of standardizing anti-daboia serum, by means of its neutralizing power *in vitro* and *in vivo* have been described and the results of experiments given.

"(2) The *in vitro* method, by reason of the ease with which it can be carried out and the regularity of the results obtained, appears to be more suitable for routine work and is considered to provide a reliable method of standardizing a serum against daboia venom.

"(3) The results of these tests are not to be interpreted as directly related to the quantity of daboia venom which will be effectively neutralized by serum used therapeutically in cases of snake-bite, but only as indicating a standard which may be used to prevent the issue of serum of poor value.

"(4) It is suggested that anti-daboia serum of such a potency that 1 cc. will neutralize *in vitro* at least 1·5 mg. daboia venom is suitable for issue.

"(5) For any biological method of standardizing antivenin against daboia venom all injections, both of serum or venom, or mixtures of both, should be given directly into the blood stream.

" (6) Evidence is put forward that the choice of animal for use in such standardizing tests is important, the suitability of the animal probably increasing with the proximity of the site of injection to the heart and great vessels, and the relative size of the vein used for inoculation. It is suggested that the pigeon fulfils these conditions better than other animals hitherto used.

" (7) The M.L.D. of daboia venom on which standardization is based should be the smallest dose which when injected intravenously brings about rapid death by intravascular clotting.

" (8) Daboia venoms appear to vary considerably in their constitution and consequently in their toxic effect, and the sample before use should be carefully tested for its effect when administered intravenously. Only those samples are suitable for standardization tests which on intravenous injection cause rapid death by intravascular thrombosis, and whose minimum lethal dose intravenously is readily determined and is not subject to fluctuation. Certain samples are definitely unsuitable for standardization work.

" Further investigation is required to determine the nature and cause of this variable action of daboia venoms." *A. A.*

MAITRA (G. C.) & MALLICK (S. M. K.). **Observations on Detoxication of Daboia Venom by Hepatic Lipoids with a Note on the Anti-Viperine Potency of Kasauli Antivenin.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 327–334. With 1 plate.

At the Kasauli Research Institute the necrotic action of Russell's viper venom has always been a trouble in the routine immunization of horses for antivenin requirements. The authors briefly discuss some methods of treating viper venom so as to abate this virulence without affecting its immunizing property and they describe in full detail how in pursuance of VELLARD's method they prepared and obtained from sheep's liver the alcohol and ether-soluble extractives--here called hepatic lipoids -which lessened the necrotic action of Russell's viper venom without impairing its immunizing value. Before exposing the said venom to the action of these lipoids it was dissolved in normal saline and mixed with glycerine (3 gm. to 1 gm. of venom) ; the mixture was evaporated to a jelly ; to this was added 5 gm. of lipoids, and the combination was incubated in a stoppered weighing-bottle for 2 months at 37°C. The venom thus detoxified was found sterile at the end of the 2 months. The authors further describe in detail how the venom when detoxified was tested on six guineapigs, two of which received gradually increasing weekly injections of untreated viper venom, the other four similarly receiving weekly injections of *treated* venom of the same brew. The two that received untreated venom showed local necrosis and pus-formation with 0·3 mgm., whereas the four that received up to 3·0 mgm. of *treated* venom showed no local necrosis, although in some cases a simple swelling occurred the day after the injection. To determine whether the treated (detoxified) viper venom could produce specific antibodies (in combination with cobra venom as in the immunization of horses for the practical purpose of Kasauli) two young goats received cobra venom and treated Russell's viper venom in gradually increasing weekly injections for a term of six months. " It was gratifying to note the absence of local necrotic reaction throughout the immunization period." When the serum of both of the goats was found to be sufficiently potent the animals were bled and antivenin was collected ; 1 cc. of serum from each goat neutralized 0·5 mgm. of cobra venom and 0·8 mgm. of Russell viper venom when tested on pigeons. An "antivenin horse" known to be very sensitive to the action of viper venom and notorious for developing abscesses, showed great reduction of these inflammatory local reactions after the preliminary treatment of the viper venom with hepatic lipoids.

From these studies it would appear that hepatic lipoids when allowed to remain in contact with daboia [Russell's viper] venom for a year at 37°C. do certainly reduce its necrotic action on animal tissues. In horses there was complete absence of local reaction to smaller doses, and though when the immunizing dose was increased to 60 mgm. a certain amount of necrosis was noticed it was remarkably less than in the reaction produced by untreated daboia venom. Simple local swelling sometimes seen after injection of treated venom the authors attribute to the presence of protein particles; but they think that if, as VELLARD holds, the detoxication of viperine venom be due to the lecithin abundant in liver tissue it might be worth while to try the effect of pure commercial lecithin on daboia venom. Besides confirming the detoxifying effect, without interference with immunizing power, of hepatic lipoids on daboia venom, a biological test of ascertaining the antiviperine potency of antivenins is described and the minimum antiviperine potency of Kasauli antivenin is explained and recorded as 1 mgm. of daboia venom per cc. of serum for standard pigeons, death appearing to be due to the action of the venom on the medullary centres, not to thrombosis. *A. A.*

EPSTEIN (David). **The Effects of Toad Venom on the Eye.**—*South African Med. Jl.* 1932. June 25. Vol. 6. No. 12. pp. 403–404.

Reports of a case of temporary painful blindness in a man into whose eye an African leopard-toad (*Bufo regularis*) had squirted some of its parotoid venom from a distance of two feet, and of appropriate experiments made on a cat with the venom. The blindness is due to local irritation, dilatation of the pupil (with subsequent anaesthesia of the cornea) and consequent interference with accommodation; the irritation and subsequent anaesthesia being due to the presence of a digitalis-like substance and the dilatation of the pupil being due to the presence of adrenalin in the venom. *A. A.*

MILLER (David). The Biology and Economic Status of New Zealand Muscidae and Calliphoridae.—Part I. Historical Review.—*Bull. Entom. Res.* 1932 Dec. Vol. 23. Pt. 4. pp. 469–476. [41 refs.]

PEARSE (A. S.). Ecology of the Ectoparasites of Nigerian Rodents and Insectivores.—Reprinted from *Jl. Mammalogy.* 1929. Aug. Vol. 10. No. 3. pp. 229–239. [18 refs.]

YAWS AND SYPHILIS.

BLACKLOCK (D. B.). **Yaws and Syphilis.**—*Ann. Trop. Med. & Parasit.* 1932. Oct. 29. Vol. 26. No. 3. pp. 423–455. [41 refs.]

The object of this paper is to re-examine those points which some writers have elaborated as differential criteria between yaws and syphilis. The author passes in review these diagnostic points as they are to be found in the vast majority of textbooks.

Yaws.—Not congenital; primary sore extragenital; typical yaw pathognomonic; furfuraceous and plantar lesions characteristic; mucous membranes not affected; itching common; alopecia not known; eyes unaffected; visceral lesions absent; nervous system never seriously affected; no endothelial proliferation; better resisted; constitutional disturbances slight; does not respond to mercury.

Syphilis.—Congenital; primary sore usually genital; syphilis seldom imitates framboesia; mucous membranes affected; itching rare; alopecia may occur; iritis common, choroiditis and retinitis rare; visceral lesions occur, *i.e.*, pericellular cirrhosis, gumma of liver, etc.; nervous system prone to infection, tabes, G.P.I.; endarteritis obliterans of viscera, cerebral thrombosis; attacks constitution affecting vital structures; responds well to mercury.

Arguments are adduced under these several headings in an attempt to show where reasoning has been fallacious in the past. Here is the author's summary :—

" (1) An attempt has been made to approach the yaws and syphilis controversy without prejudice, a notoriously difficult matter.

" (2) The usually accepted differential criteria have been discussed and examined from various aspects.

" (3) It is shown that in compiling the differential tables, fallacies have been introduced chiefly owing to comparisons being made between things which are not properly comparable.

" (4) Arguments are brought forward against comparing yaws, which is mainly a non-venereal disease of children in rural areas of the tropics and which begins by an extragenital primary lesion, with venereal adult syphilis of Europeans.

" (5) The accounts of adult venereal syphilis as it affects natives in tropical countries, are not as yet complete, but so far as they go they indicate that such syphilis varies as greatly, in many respects, from venereal syphilis in adults in temperate climates, as does yaws

" (6) The evidence that yaws is other than syphilis modified by age, race and various local conditions, does not appear convincing; the onus of proof rests on those who maintain that these are two distinct diseases."

[This is a most interesting contribution to the discussion. It remains to be seen whether Professor Blacklock's arguments will make a general appeal. They will require careful consideration Since the author considers " the onus of proof rests on those who maintain that these are two distinct diseases," it is presumed that he is convinced of their identity.] *H. S. Stannus.*

von BÜLOW (T.). Un cas de surinfection dans le pian. [**Surinfection in Yaws.**]—*Bull. Soc. Path. Exot.* 1932. Oct. 12. Vol. 25. No. 8. pp. 869–874.

The author starts by pointing out the necessity of distinguishing between " surinfection " and reinfection. He then goes on to define the two conditions but both under the name of surinfection, doubtless *as the result of a printer's error, so that the reader is left in doubt as to what the author is trying to prove.

The case which forms the basis of the article was a woman aged 20 in Costa Rica. In 1925 she had a primary yaw, according to her story, on the front of the lower part of the leg followed by two or three very small secondary lesions, all of which disappeared 18 months later without treatment. In 1929 a primary yaw [*sic*] appeared on the foot, followed by secondary lesions which disappeared quickly while the primary lesion persisted. The author concludes that this was a case of " surinfection " made possible by the poor immunity developed in the first attack owing to the lack of a good outcrop of secondary lesions.

H. S. S.

MONTEL (R.). A propos de la communication de T. von Bulow sur un cas de surinfection dans le pian. [**Von Bulow's Paper on Surinfection in Yaws.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 946–947.

Montel criticizes the deductions made by VON BULOW in his case which he called one of surinfection in yaws. He points out that the history of the first infection is not conclusive and the so-called second infection might well be a late ulcerative lesion. Montel holds in contradistinction to VON BULOW that the primary lesion seldom undergoes spontaneous healing, but lasts a long time, though very easily cured by N.A.B.

[This criticism appears well merited. Much that is written upon yaws is recorded without sufficient care.] *H. S. S.*

DE AZEVEDO (Rinaldo). A aurotherapia na bouba. [**Gold Treatment of Yaws.**]—*Brasil-Medico.* 1932. Nov. 19. Vol. 46. No. 47. pp. 984–987. With 1 fig.

The author gives details of four cases of yaws in patients of 13, 14, 18 and 35 years. He treated them by means of solganal B. To the oldest he gave 0·1 gm. intravenously at 5-day intervals for 6 doses ; the next (18 years of age) had the same amount for 3 doses, similarly administered, followed by 0·15 gm. intramuscularly for 3 doses at the same intervals ; the two youngest had the latter method only. The lesions cleared rapidly in all cases, leaving of course some scarring, but none showed any signs of intolerance and in none did the total amount exceed 0·9 gm. A fifth patient is referred to, but his history is not given, beyond the fact that he was a man of " 30 odd " years who was cured with a series of 8 intravenous injections of 0·1 gm. each at five-day intervals. *H. H. S.*

TESSITORE (C.). Néosalvarsan e rhodarsan nella cura del pian e della sifilide infantile per via endomuscolare. [**Neosalvarsan and Rhodarsan in Young Children with Yaws or Syphilis.**]—*Arch. Ital. Sci. Med. Colon.* 1932. Oct. 1. Vol. 13. No. 10. pp. 633–634. English summary (5 lines).

In the Belgian Congo both neosalvarsan and rhodarsan have been used by gluteal injection in strengths of 1–1·5 per cent. [amount injected is not mentioned], for yaws or syphilis in children of 2 years or less. Within a short period the parents returned with their infants and those who had received rhodarsan presented local infiltration, painful, rapidly spreading, doughy and threatening to suppurate ; they had also a raised temperature.

These signs began to appear within 12–24 hours of the injection. Neosalvarsan gave rise to a slight local, but no systemic reaction. For this reason instructions have been sent to medical officers to employ the latter drug for all young children requiring arsenical injections. *H. H. S.*

FRÖHLICH (Hans). Zur Kenntnis der luetischen juxtaartikulären Knotenbildungen. [**J.A.N. due to Syphilis.**]—*Arch. f. Dermat. u. Syph.* 1932. Aug. 13. Vol. 166. No. 1. pp. 226–233. With 6 figs.

Judging by the fact that five cases of J.A.N. have been recorded in the Breslau skin clinic in the last nine years as "etiology unknown," the author believes that it is still not generally recognized that this affection is a syphilitic one. Notes of two cases are given, both men, both without venereal history, but both with manifestations of syphilis and positive W.R. In each some response to anti-specific treatment was noted. *H. S. S.*

STEEL (C R) The Aetiology of Yaws - *Jl Trop Med & Hyg* 1932 Nov. 1 Vol 35 No 21 pp 321 324 With 12 figs & 3 charts

VERBUNT (J. A) Over den gewonen vorm van den uitslag bij framboesia — *Nederl Tijdschr v Geneesk* 1932 Nov 26 Vol 76 No 48 pp 5418–5425. With 5 figs on 2 plates

REVIEWS AND NOTICES.

SMITH (E. C.) [B.A., M.D. (Dublin), D.P.H., D.T.M. & H. (Eng.), etc.]. **An Atlas of Skin Diseases in the Tropics.**—pp. x+60. With 2 coloured plates & 253 figs. on 100 plates. 1932. London: John Bale, Sons & Danielsson, Ltd., 83–91, Great Titchfield Street, W.1. [21s.]

This volume may be described as a very meritorious effort to fill a serious gap in medicine. Its scope is restricted to West Africa, however, a fact which is fully explained both in the folder and in the preface, and is determined by the very excellent reason that the book is based on purely personal experience, which fact greatly increases its value. Nevertheless it would perhaps be better to indicate this restriction in the title. A few other criticisms may be made, but they are all of small importance and are tendered as being suggestive of ways in which some improvement might possibly occur. As both the subject matter and the figures are arranged alphabetically, the omission of an index might be justified, but it would be useful where different synonyms are in common use. The only exception to this alphabetical arrangement is the inclusion of Gangosa after Yaws and it seems rather a pity to spoil the system when it is not absolutely proven that the disease is a late form of Yaws. Again, on glancing through the table of contents it would appear that Tinea cruris is not illustrated, yet fig. 116 shows an excellent example. The subject matter is presented in a very readable manner. The paper and printing are alike both excellent and clear, giving rise to no eye-strain.

The book is essentially an atlas, yet in spite of that many of the diseases could be dealt with a little more fully with advantage. Dermal Leishmaniasis is dismissed with the remark that it is not seen in Southern Nigeria, yet it is of such importance that it would be justifiable to omit the personal element here. In the description of Epidermophytosis, no reference is made to infection of the feet or hands. In Moniliasis, paronychia is neglected. Also approval cannot be extended to the paragraph on Molluscum contagiosum for it is by no means always easy to diagnose, nor is the following phrase correct, " if incised a lobulated mass of fat or sebaceous material is obtained," unless it is clearly indicated that this is a purely clinical description. Nor is " shirt-button tumour " a happy phrase, for it is liable to cause confusion with Biskra button, and is certainly not a good clinical description of a " domed " tumour. To the useful details concerning the microscopical methods of detecting fungi, there might be added a warning against the common error of diagnosing fat globules as spores.

The photographs are deserving of the highest praise. Rarely has such a clear and typical collection been seen. Of the whole 250 or more, only five are unworthy of their company. The illustration of Onychomycosis is good but does not show the effects of friability or the thickening of the nail-bed sufficiently; one of Tinea flava could be excluded as there are other and better examples; Herpes zoster of the popliteal space might be almost any vesicular eruption; the Haemangioma of the scalp is badly out of focus, whilst the " Monilial patches on face of young girl " are quite indistinguishable. Although this list of complaints might seem formidable, they are in reality only small and almost unnoticeable in a book of this description. To its general presentation only the highest praise can be given; and it is to be sincerely hoped that the author will be sufficiently encouraged to produce a larger edition in due course. He has set an example which could be imitated by workers in other tropical fields, with great advantage to the whole of dermatology. *M. Sydney Thomson.*

CHOYCE (C. C.) [C.M.G., C.B.E., B.Sc., M.D., F.R.C.S., Professor of Surgery, Univ. of London, etc.] & BEATTIE (J. Martin) [M. A., M.D., C.M., M.R.C.S., Professor of Bacteriology, Univ. of Liverpool, etc.]. (Pathological Editor.) [Edited by.] **A System of Surgery.** Third Edition. In Three Volumes. Vol. 1. pp. xxiv +1112. With 33 colour & 67 half-tone plates & 285 figs. in text. Vol. 2. pp. xv+1111. With 16 colour & 11 half-tone plates & 367 figs. in text. Vol. 3. pp. xvi+1107. With 11 colour & 39 half-tone plates & 277 figs. in text. 1932. London, Toronto, Melbourne & Sydney: Cassell & Company, Ltd. [£6 net the 3 volumes.]

The Third Edition of Choyce's System of Surgery contains a large amount of new matter necessitated by the surgical advances of the nine years which have elapsed since the publication of the second edition. 29 new plates and 210 new illustrations have been introduced and there are fourteen new contributors.

Volume I deals with "Surgical Pathology, Tumours, Venereal Diseases, Breast and General Surgery." This list does not, however, do justice to its contents and requires some amplification. There is a particularly instructive chapter on the preparation, administration and mode of action of serums and vaccines with due note of anaphylaxis and an interesting short reference to Bacteriophage. The Elastoplast treatment of chronic leg ulcers and various forms of skin grafting are briefly described. General surgical technique, the tannic acid treatment of burns and scalds, haemorrhage and shock are all ably discussed. A short chapter deals in a succinct manner with Toxaemia, Septicaemia and Pyaemia while another chapter, copiously illustrated by skiagram reproductions, treats of X-ray diagnosis in all its many branches. Other chapters deal with Radium Therapy, Tuberculosis, Gonorrhoea and Syphilis. The beautifully reproduced coloured plates of syphilitic lesions of skin and mucous membrane and the useful tables of routine treatment of various types of case deserve special mention. Some 250 pages are devoted to an exhaustive classification and description of Tumours.

Yaws, Gangosa, Tropical Sore, Leprosy, Madeira Foot and Ulcerating Granuloma have short sections devoted to them which have been brought up-to-date by the addition of notes of recently introduced developments chiefly in treatment. In conditions such as these, in which active research is still in progress, it is perhaps unavoidable that a certain lack of conviction should be suggested by the multiplicity of the medicaments recommended for treatment.

Sections on Glanders, Actinomycosis, Tetanus, Anthrax, Schistosomiasis, Elephantiasis, Bites and Stings by insects and snakes and even Poison Wounds inflicted by fish indicate how the needs of surgeons in all parts of the world have been catered for.

The four pages devoted to Plastic Surgery, which are included in the chapter on Lesions of the Skin and Subcutaneous Tissue, give no indication of the great advances which have been made in this branch of Surgery during recent years. We feel that the inclusion of a few well-chosen diagrams and photographic illustrations, while not materially adding to the length of the chapter, would be appreciated by the many surgeons who are called upon to carry out the less complicated plastic procedures in the course of their routine work.

The chapter on Breast, which completes the volume, is a masterly exposition of the subject.

Volume II.

The chapter on the spleen will be found valuable chiefly for its able discussion of the various forms of Splenomegaly and the indications for Splenectomy.

In the chapter on Malformations of the Face, Lips and Palate, we are glad to note the addition of much new material and several new illustrations, and we are particularly pleased to see due notice given in the section on Cleft Palate to the work of VEAU of Paris and WARDILL of Newcastle, for we consider that the methods developed by these two surgeons represent the main advances made in recent years in this difficult branch of surgery.

The short section on Dysenteric Ulceration of the intestine makes no reference to the two distinct varieties of the disease, Bacillary (bacterial) and Amoebic. Although the bulk of the section, and more particularly the treatment described, applies to the former type, the statement that " abscess of the liver is also a frequent complication " could apply only to the latter. In a later chapter by another contributor, it is correctly stated that liver abscess " only very occasionally complicates the bacterial form of the disease."

Assuming that the section refers to bacillary dysenteric ulceration, we find ourselves opposed to the suggestion of making an artificial anus in the ascending colon, for it is common experience to find the caecum and ascending colon seriously involved and in severe cases, in spite of the recognized objections to an artificial anus in the small bowel, we believe that nothing short of an ileostomy holds out any real prospect of cure. Ileosigmoidostomy is recommended as preferable, when possible, to the formation of an artificial anus. This procedure, although certainly offering rest to the most seriously affected parts of the bowel, provides no means of active treatment of the ulcerated areas. In the majority of cases involvement of the lower parts of the colon renders it impracticable. When performed it is essential that efficient medication of the short-circuited loop of actively ulcerated bowel shall be provided for by the concomitant establishment of caecostomy or appendicostomy.

The section on Subphrenic Abscess is an excellent guide to the differential diagnosis of suppurative conditions in, or in the neighbourhood of, the liver.

Diseases of the rectum and anus are fully discussed and the treatment of piles by sclerosing injections and of fissure-in-ano by local anaesthetic injections is briefly described.

The section on Tropical Abscess of the Liver cannot be allowed to pass without the following criticisms. No mention is made, in the discussion of diagnosis, of lateral X-rays in which irregularity of outline frequently indicates the presence of an abscess when little evidence is given by the more usual antero-posterior views. The treatment of secondarily infected abscess by the Carrel-Dakin method, which has proved so efficacious, is omitted. A 3 inch exploring needle appears to us much too short an instrument for effectively exploring so large a mass of tissue as an enlarged right lobe of the liver.

The description of renal function tests and of the routine investigation of urinary conditions is well worthy of special study.

Volume III.

Much new material has been introduced by the new contributor of the chapter on " The Neck " more particularly in that section dealing with diseases of the Thyroid Gland.

The article on Peripheral Nerves has been brought up-to-date and is greatly helped by the inclusion of new diagrams. Due mention is made of recent developments in the surgery of the sympathetic nervous system, and we note with interest that Periarterial Sympathectomy is condemned as a procedure founded on an erroneous conception of the distribution of sympathetic nerve supply to limb vessels.

The chapters on Skull, Brain and Spinal Cord have been revised and remain the outstanding contribution to the literature of the subjects they treat.

There are excellent chapters on Bone and Joint diseases and Orthopaedic Surgery. The latter contains an instructive section on physiological and mechanical principles of Bone grafting and an equally interesting one on

Manipulative Surgery. From the latter may be re-quoted, in reference to joint stiffness, the rule " When in doubt, move " as being likely to give more successes than failures.

The first edition of Choyce's System of Surgery has been for many years our favourite book of surgical reference. We therefore commenced this review of the new edition with a very definite bias in its favour ; our study of the 3,000 odd pages has served only to confirm this bias for it is difficult to imagine a publication more replete with information presented in so readable a form. The time has passed when any one surgeon could be expected to know enough about every branch of Surgery to make his writings on subjects outside his specialty in any sense authoritative. The pages of these three volumes speak with the recognized authority of the specialists who have undertaken the writing of chapters on subjects of which they have extensive first-hand knowledge and the " scissors and paste " method of compilation plays no part in their production.

The volumes are not intended as a text book for students but they should be found on the book-shelves of all practising surgeons who wish to keep themselves abreast of recent advances and should make a special appeal to those working for the higher examinations in surgery.

T. Pomfret Kilner.

WONG (K. Chimin) [L.M.S., Hongkong] & WU LIEN-TEH [M.A., M.D. (Cantab.), etc.]. **History of Chinese Medicine. Being a Chronicle of Medical Happenings in China from Ancient Times to the Present Period.**—pp. xviii + 706. With frontispiece, 92 illustrations & 1 coloured map (in pocket). 1932. Tientsin: Tientsin Press, Ltd. [30s.].

It is probable that most of us who take up this volume will do so in a spirit of mild literary interest with little thought of acquiring useful medical knowledge. Its pages, however, unfold a remarkable story reaching back to the very foundations of history and covering the whole range of Chinese medical history—a matter of over 4,500 years. The plan of this work is to consider both the old style Chinese medical practice (the time-honoured indigenous art) and the introduction and development of Western Medicine to China. The earliest records are those of the Ancient or Legendary Period (2697–1122 B.C.) which was largely mythological and full of legends concerning the founders of Chinese medicine, the most venerated of whom was SHEN NUNG, The Father of Medicine, still worshipped by native Drug Guilds as their patron god. In course of time these legends developed into more reliable history and we come to the second great phase, the Historical or Golden Period (1122 B.C.–960 A.D.), when, under the CHOU Dynasty, literature, art and philosophy flourished—a state of civilization.

In 206 B.C. was founded the HAN Dynasty which is regarded as the most glorious epoch in Chinese medical history, and was rendered specially memorable from the fact that during this period there lived three of the greatest doctors China has ever had who placed Medicine on a scientific basis that has stood the test of time curiously well. And all this, be it noted, at a time when our ancestors in Britain were savages and cave-dwellers. The march of progress was, however, interrupted during the succeeding T'ANG Dynasty when owing to Indian influence the cure of disease fell under a system of charms, incantations and magic. Briefly stated the CHOU Dynasty was the age of philosophy, the HAN Dynasty the age of science and the T'ANG Dynasty the age of superstition. From the tenth to the seventeenth century Chinese medical thought became confused and controversial: this was the Mediaeval Period (961–1800 A.D.). It was succeeded by the Modern or Transitional Period (1801–1932 A.D.) which has had as its most prominent feature the struggle for supremacy between the old and new forces, the latter slowly and steadily gaining ground.

The foregoing observations summarize the salient features of Chinese medical history. The first three periods, as dealt with in this book, are written by Dr. CHIMIN WONG who is regarded in the East as the leading medical historian of China. Chapter VI is specially interesting as it introduces to the Western reader the Nei Ching, Internal Classics or Canon of Medicine, which is the oldest as well as the greatest Chinese medical classic. It is a compilation by various writers made 3,000 years ago and sums up the experimental, physiological and theoretical knowledge of all the preceding centuries. It is the earliest attempt to systematize the medical thoughts of these ancient times and even at the present day it is the favourite theme of Chinese medical writers to annotate and comment on this work. Among other interesting items it shows that at this early period the ancient Chinese had indeed grasped a good part of the truth concerning the circulation of the blood.

They were a sapient lot these old Chinese doctors. In the Record of Rites written during Confucian times (552–479 B.C.) we note a warning that no one should take medicine compounded by a doctor who was not backed up by an experience of three generations. Also we are told that if a medicine does not raise a commotion in the patient the disease will not be cured by it, and that one can remove the trouble only when one knows the cause. In the opinion of WEN CHUNG TZU the able doctor should first attend to sleep and diet before resorting to drugs.

Chapter VIII gives an enlightening account of Drs. TS'ANG, CHANG and HUA who lived between the years 180 B.C.–270 A.D. The fame of the last of the trio, Dr. HUA, rests chiefly on his marvellous skill as a surgeon. He successfully trephined for brain tumours and introduced the operation of castration to produce eunuchs for the Imperial Palace. By means of an effervescing powder he induced anaestheisa though this was no novelty, for in 200 B.C. it is noted that P'IEN CH'IAO had procured numbness and insensibility by a narcotic wine. There are other notices of the life and works of leaders of Chinese medical men a-down the Ages, and a good description is given of the PEN TS'AO or Chinese Materia Medica which has a history as old as that of the Chinese race and has gone through many editions, the first of which is ascribed to SHEN NUNG who lived 2838–2693 B.C. Few departments of our profession escaped the notice of these wonderful ancients. Public Health, Obstetrics, Gynaecology, Surgery were all handled in a surprisingly scientific way that will grip the attention not only of our medical historians but of general readers who will find much of interest in Dr. WONG's account.

Latter day history beginning in 1804 saw the first seeds of modern health and medicine planted by medical missionaries in China. It is dealt with by Dr. WU LIEN TEH who has given as full an account as he could gather of the work of Foreign and Chinese doctors in establishing modern scientific medicine in China. It is a record of slow progress till within the past thirty years when the profession has made its influence more widely felt especially in the realm of Public Health. But this story lacks the fascination of the traffics and discoveries of ancient times.

The printing and illustration of the volume are a credit to the Tientsin Press Ltd. of Tientsin, North China. *Douglas Gray.*

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE,
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BUREAU OF HYGIENE ~~AND TROPICAL~~ DISEASES.

TROPICAL DISEASES BULLETIN.

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NEW DRUGS IN THE TREATMENT OF MALARIA.

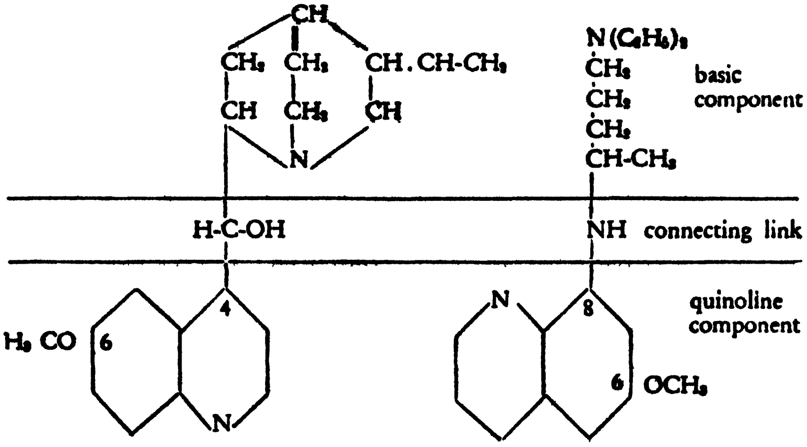
By William FLETCHER, M.D., M.R.C.P.,
Sectional Editor, Tropical Diseases Bulletin.

MANSON's dictum, that it was culpable trifling to use any drug to the exclusion of quinine in the treatment of serious cases of malaria, remained true for many years in spite of the vaunted nostrums which were continually being put on the market. To-day, his words appear to need revision, and it seems opportune to make a compilation from the papers bearing upon the present position which have been summarized in this *Bulletin*. The figures in brackets which follow the names of authors are for the identification of the respective summaries; the first figure gives the year, the second in black face type gives the volume, and the third the page of the *Bulletin*. We propose to deal first with the synthetic drugs, because of their greater importance.

Plasmoquine.

Origin.

The shortage of quinine during the war led to experiments at Elberfeld with the object of finding a synthetic drug which could be used in its stead (MÜHLENS, 1932, **29**, 706). The only substances, other than quinine, which were found to have a definite effect in malaria were the arsenicals, such as salvarsan which acted on *P. vivax*, and methylene blue which acted on *P. malariae*. SCHULEMANN and his colleagues (1932, **29**, 704) chose methylene blue for investigation; they prepared a large number of compounds which were tested by ROEHL on canaries infected with *Plasmodium relictum*, and among these compounds they found one which was particularly effective; this was an amino-quinoline in which a basic aliphatic radicle was united to a quinoline nucleus by a connecting link of nitrogen. This substance was modified in many ways, and eventually the compound first known as beprochin, and afterwards as plasmoquine, was produced; its structural formula is given below. It proved to be more effective than quinine in the malaria of birds, and it was therefore selected for practical clinical investigation (SCHULEMANN, SCHÖNHÖFER & WINGLER, 1932, **29**, 353), with the result that SIOLI and MÜHLENS (1927, **24**, 265 and **266**) found that it was effective in benign tertian and quartan malaria; in subtertian it had no therapeutic value because it had no action on the schizonts, but, in compensation, it possessed the remarkable and unique property of destroying the crescents.



$C_{20}H_{24}O_2N_2$
Mol. Weight 324

$C_{19}H_{29}ON_3$
Mol. Weight 315

'QUININE' 'PLASMOQUINE'

The structural formulae of quinine and plasmoquine after SCHULEMANN (1932).

Action in Subtertian Malaria.

These conclusions were speedily confirmed by other workers in different parts of the world: not only did the drug destroy all forms of *P. vivax* and *P. malariae*, but it also possessed the singular property of destroying the gametocytes of *P. falciparum* in the peripheral blood. By itself it was useless in the treatment of subtertian malaria, because it had no action on the schizonts; indeed it was found by several observers to have a provocative action (FISCHER & WEISE, 1928, 25, 135; KLIGLER & REITLER, 1929, 26, 922; HASSELMANN & HASSELMANN-KAHLERT, 1930, 27, 208). It was, therefore, still necessary to treat this type of malaria with quinine, but plasmoquine was given at the same time in order to destroy the crescents, and so to prevent the patient from acting as a source of infection.

Action in Benign Tertian and Quartan Malaria.

The complete cure of benign tertian and quartan malaria is more often brought about by plasmoquine than by quinine (BAERMANN & SMITS, 1929, 26, 372; MÜHLENS, 1930, 27, 658; MORISHITA, 1931, 28, 1009; SLATINEANU, BALTEANU & ALEXA, 1933, 30, 62). JARVIS (1933, 30, 81) treated 126 cases of benign tertian with 0·03 gram of plasmoquine and 20 grains of quinine daily, for 3 weeks, with only 6 relapses. PELTIER (1931, 28, 975) treated a large number of benign tertian and quartan cases with quino-plasmoquine tablets, which consist of plasmoquine and quinine in the proportion of 1 to 30 as recommended by SCHULEMANN, with the result that only 4 per cent. of the benign tertian cases relapsed, and none of the quartan. MORISHITA, MIYAHARA & ISHIOKA (1933, **30**, 81) have had a similar experience in the cure of quartan malaria; they treated 11 cases with 0·04 gram of plasmoquine for 5 days, with complete cure in every case, while 2 controls treated with quinine both relapsed. SCHULEMANN (1933, **30**, 78) states that treatment with quino-plasmoquine has reduced the relapse rate of benign tertian to 3 per cent. as compared with 50 per cent. under quinine treatment, and that in quartan malaria no relapses have been recorded. This is not always the case as regards benign tertian, for there appear to be certain strains which are resistant to plasmoquine (SWELLENGREBEL & DE BUCK, 1933, **30**, 89), and in a recent report of the Malaria Commission in Holland (*ibid.*, 72) it was noted that while, in one district, only a single relapse occurred among 66 cases of benign tertian treated with 0·03 gram of plasmoquine and 15 grains of quinine, yet, in another district, the same treatment was followed by about 50 per cent. of relapses.

Prophylactic Action.

JAMES, NICOL, and SHUTE (1931, **28**, 973) have shown that plasmoquine acts as a prophylactic. Ten healthy volunteers were given a prophylactic dose of 0·06 gram of plasmoquine daily for six days, and, shortly after they had received the second dose, they were bitten by *A. maculipennis* heavily infected with benign tertian sporozoites. As the result of the plasmoquine, all the volunteers were protected; none of them had a normal attack of malaria, but five of them sustained latent infections and had primary attacks seven to nine months later. JAMES (1933, **30**, 76) concludes that plasmoquine is a true prophylactic, but that the dose required for complete protection is too large to be safe. It is an even better protector against subtertian infection. SWELLENGREBEL & DE BUCK (1932, **29**, 357; 1933, **30**, 78) repeated JAMES's experiment, using a daily dose of 0·03 gram instead of 0·06: but in this instance, all the volunteers went down with normal attacks, except one in whom the first attack occurred about 8 months later. SWELLENGREBEL considers that the exceptionally high vitality of the infecting strain of benign tertian which he employed, and the large number of mosquito bites inflicted, may be the explanation of the failure to protect in this experiment. RUSSELL (1932, **29**, 353) found that canaries under treatment with plasmoquine were protected against inoculation of *Plasmodium cathemerium*, but that this protective effect passed off within a few hours of stopping the drug.

Toxic Action.

The doses of plasmoquine which were given when it was first used, were far larger than those which are given to-day, and it was soon found to be much more toxic than had been supposed. As early as 1926, SIOLI (1927, **24**, 265) reported several cases of poisoning among his patients; one to whom he had given 0·075 gram daily for eight days was seized with pains in the abdomen, and passed black urine; his lips were livid and his blood was the colour of chocolate. Both urine and blood showed the spectrum of methaemoglobin.

Severe toxic symptoms sometimes arise with startling suddenness, but more often the onset is less abrupt; cyanosis of the lips, or griping pains, are warning signs, and if the plasmoquine is stopped at once the symptoms soon pass off. If, on the contrary, it be continued, the cyanosis spreads to the palate, gums, and finger-nails, the temperature rises, and an attack resembling blackwater fever develops, accompanied by destruction of red cells, haemolytic jaundice, and black urine containing methaemoglobin. Even when this stage has been reached, recovery may follow if the drug is stopped and injections of glucose and adrenalin are given (MANSON-BAHR, 1927, **24**, 741, and FREIMAN, 1929, **26**, 930). SINTON, SMITH & POTTINGER (1930, **27**, 656) report that severe toxic symptoms sometimes appear after treatment has been completed.

The examination of the liver in fatal cases shows hepatitis and fatty degeneration or necrosis (MANIFOLD, 1931, **28**, 1007 ; HASSELMANN & HASSELMANN-KAHLERT, 1930, **27**, 208 ; HULSHOFF, 1929, **26**, 373 ; BAERMANN & SMITS, 1927, **24**, 740), and it is probable that there is greater danger in cases where the liver has already been damaged by malaria but, apart from this, certain individuals are peculiarly sensitive to the drug. SINTON, SMITH & POTTINGER (1930, **27**, 656) have suggested that some batches of plasmoquine are more toxic than others, but the manfacturer's examination of a sample which they suspected did not confirm this.

The Dose.

Severe cases of poisoning are less common now that smaller doses are given. Six years ago, MÜHLENS (1927, **24**, 738) was giving as much as 0·18 gram a day, and daily doses up to 0·1 gram were frequently employed. CORDES (1928, **25**, 566) records two fatal cases, in which doses of 0·08 to 0·1 gram were given daily. BAERMANN and SMITS, reviewing the position for the year 1928, found that four deaths and eleven cases of severe intoxication had been reported.

Doses of 0·06 *gram.*—The dose recommended by SCHULEMANN & MEMMI in 1926 (1927, **24**, 739) was 0·06 gram a day ; but even with this dose, toxic symptoms occurred frequently. BROSIUS (1927, **26**, 15) reported that out of 60 cases treated by him with 0·06 gram daily, 10 had suffered from cyanosis, blackwater, or other symptoms of poisoning. With the same dose, DE BUEN (1929, **26**, 374) found it necessary to stop the treatment in 14 per cent. of his cases. NAMIKAWA (1929, **26**, 377) recorded that 9 out of 25 patients suffered from severe toxic symptoms ; SINTON, SMITH and POTTINGER (1930, **27**, 656) 11 out of 17 ; SQUIRES (1928, **25**, 567) had a similar experience ; HULSHOFF (1929, **26**, 373) reported a fatal case.

Doses of 0·04 *gram.*—Even with the smaller daily dose of 0·04 gram, together with 20 grains of quinine, SINTON and his colleagues (1930, **27**, 656) found that toxic symptoms appeared in 12 out of 48 men who were undergoing a continuous course of 21 days. MANIFOLD (1931, **28**, 1007) has reported on the results of the treatment of 3,187 soldiers by the same method ; among them there were two deaths and two serious cases of methaemoglobinuria, and he concluded that it was definitely unsafe to issue plasmoquine to patients who were not under medical supervision ; good results might be met with in 99 cases and disaster in the hundredth. Like opinions have been expressed by many workers, among whom are SINTON and BIRD (1929, **26**, 14), BAERMANN and SMITS (*ibid*, 372), NAMIKAWA (*ibid*, 377), KLIGLER and REITLER (*ibid*, 922), HASSELMANN & HASSELMANN-KAHLERT (1930, **27**, 208), SINTON, SMITH and POTTINGER (*ibid*, 656).

Doses of 0·03 *gram.*—Even with daily doses as small as 0·03 gram, FISCHER and WEISE (1928, **25**, 135) found methaemoglobin in 10 out of 13 patients, and PIEBENGA (1932, **29**, 710) who treated patients in

Holland with a daily dose of 0·03 gram of plasmoquine combined with 15 grains of quinine, over a period of 14 days, considered it necessary to exercise strict control. But, on the whole, it appears that this dose is reasonably safe, provided that it is given for a period of not longer than 6 or 7 days without a break. MACPHAIL (1931, **28**, 106) treated several thousands of people in Guatemala with a daily dose of 0·03 plasmoquine combined with 20 grains of quinine, over a period of 6 days, and toxic symptoms were observed in only one case.

Doses of 0·02 *gram.*—A daily dose of 0·02 gram of plasmoquine, together with 24 grains of quinine, is the standard treatment on the United Fruit Company's plantations; in places where more than 25 per cent. of the labourers are infected, this treatment is given to the whole population without any special supervision, and apparently with safety. The Company own many plantations where antimosquito measures are impracticable, and they rely on the discovery of all "positive" cases and their treatment with this six-day course of plasmoquine and quinine (DEEKS, 1931, **28**, 978; CONNOR, 1933, **30**, 61).

The Prevention of Mosquito Infection.

The real value of plasmoquine lies less in its power to cure—quinine and atebrin are less toxic—than in its power to prevent the spread of malaria. This is due to its unique effect upon the viability of the crescents which prevents their development in the mosquito host, and for this purpose very small doses are sufficient. MANSON-BAHR (1928, **25**, 564) showed that a single dose of 0·03 gram, though not large enough to destroy the crescents, was yet sufficient to prevent their exflagellation on a glass slide. BARBER, KOMP, and NEWMAN (1929, **26**, 939) administered 0·04, 0·015, and 0·005 gram respectively, to three cases of subtertian malaria whom they had proved to be good infectors of mosquitoes. These doses did not reduce the number of crescents in the blood, but they rendered the patients non-infective to mosquitoes for several days, and BARBER concluded that "amounts of plasmoquine within the limits of safety are effective against gametocytes, and may be combined with quinine (and caution) in the treatment of populations." This work was confirmed by WHITMORE (1931, **28**, 107) who found that a dose of 0·02 gram, or about 0·00033 gram per kilo of body-weight, was sufficient to render a patient non-infective to mosquitoes; SUR, SARKAR & BANERJI (1933, **30**, 85) and others have had similar results. AMIES (1931, **28**, 599) states that 0·04 gram, given in two doses of 0·02 gram, sixteen hours apart, renders crescent-carriers non-infective for at least three days, and that if the dose is repeated every fourth day they remain so.

The mass treatment of labour forces on these lines, with small doses of plasmoquine, has been employed in many places as an antimalaria measure, but the success of the method depends upon the extent to which the group is under control, and SCHULEMANN (1932, **29**, 704) has recently expressed the opinion that antimosquito measures will still be necessary, for though plasmoquine will render a gametocyte-carrier incapable of infecting mosquitoes, it will rarely be possible to treat every carrier in a district. CLEMESHA and MOORE (1931, **28**, 576), have reported the remarkable success of the method, combined with anti-larval measures, on an isolated tea-estate in Travancore: but they point out that their labour force was under complete disciplinary control, and they consider that anti-gametocyte treatment would be hopeless with an ordinary civil population. BARBER and his colleagues

(1932, 29, 686) obtained success with 0·01 gram of plasmoquine administered twice a week to groups of labourers in Liberia, but within fourteen days of stopping it, the infection rate of the local anophelines rose rapidly, and they concluded that " the group to be treated should be more or less isolated from non-treated groups, and should be amenable to treatment." DE MELLO and BRAS DE SA (1932, 29, 359) successfully treated the population of an isolated village, but an influx of labourers from malarious districts undid their work. KLIGLER and MER (1931, 28, 599) treated the inhabitants of five villages in Palestine, and thereby materially reduced the percentage of human and mosquito infection, but within two weeks of stopping the treatment its good effects had disappeared, and they concluded that " mass treatment in an infected region, at a time when infected mosquitoes are already about, is entirely ineffectual in so far as checking or controlling the disease is concerned."

KINGSBURY and AMIES (1932, 29, 359) gave 0·04 gram twice weekly to 330 labourers on a rubber estate, for a period of 12 months. The sickness rate was reduced by 50 per cent., and no crescent carriers could be found at the end of the experiment, but there was only a slight improvement in the splenic index, and the parasite-rate was not reduced to a greater degree than on the control areas.

It is, unfortunately, impossible to control the administration of plasmoquine (as it is possible to control the administration of quinine) by the application of a simple test to small samples of urine. The quantity of plasmoquine is so small that, in order to detect it by SCHULEMANN'S chloranil test (1928, 25, 568) it is necessary to collect several hundred cubic centimetres, over a period of several hours, and extract with ether. Plasmoquine is present during the first eight hour period, but not later (GREEN, 1930, 27, 654).

Atebrin.

Origin and Tests on Birds and Men.

The work of SCHULEMANN and his colleagues at Elberfeld, which culminated in the synthesis of plasmoquine, was continued by MIETZSCH and MAUS ; more than 12,000 compounds were evolved and eventually the drug now known as atebrin was produced ; it was first called erion or plasmoquine E. It is the dihydrochloride of an alkylamino-alkylamino-acridin derivative; a yellow powder with a bitter taste, soluble to 7 per cent. in water at 40°C. and, like quinine, fluorescent under ultraviolet radiation. KIKUTH (1932, 29, 705) found, as the result of tests made with *Plasmodium praecox* and *Haemoproteus orizivorae* infections of birds, that it destroyed the schizonts, but differed from plasmoquine in not being a gametocide. If rice-birds infected with *H. orizivorae* were treated with plasmoquine, the gametocytes were destroyed, but, when the drug was stopped, they appeared again, having developed from the schizonts in the endothelial cells, which had been unaffected by the plasmoquine. When atebrin was given in addition to plasmoquine, these schizonts were destroyed and relapses occurred no more, or only after a long interval (SCHULEMANN, 1933, 30, 78). Tests in therapeutic and naturally occurring malaria, made by SIOLI, PETER, and MÜHLENS (1932, 29, 705–6), showed a similar action in man ; its effect on human malaria resembled that of quinine, for it destroyed all forms of benign tertian and quartan parasites, and also the schizonts of malignant tertian, but it left the crescents untouched.

Dose.

The usual dose of atebrin is 0·1 gram, three times a day; and, in subtertian malaria, 0·01 gram of plasmoquine is generally given with it in order to destroy the crescents. Many of the United Fruit Company's officers have found it equally effective, and more convenient, to give the daily amount of 0·3 gram in a single dose instead of dividing it into three (1933, **30**, 61). GREEN (1932, **29**, 707) found 0·2 gram a day too little, and 0·4 gram a day too much; he considers the optimum daily dose to be about 0·1 gram per 18 kilogram bodyweight, given for six or seven days. As regards the length of the course, MÜHLENS & FISCHER (1932, **29**, 706) recommend seven to ten days, but JAMES, NICOL & SHUTE (1932, **29**, 695), HOOPS, (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1932, **26**, 289–294), and others have had excellent results with a course lasting only five, which would mean a considerable reduction in the cost, where there were large numbers to be treated.

Toxic Action.

The toxicity of atebrin is low: SIOLI (1932, **29**, 705) found that double the usual daily dose of 0·3 gram was well tolerated, but that larger doses caused gastro-intestinal symptoms. Three out of 50 patients treated by GREEN (1932, **29**, 707) suffered from severe pain in the abdomen which appeared on about the fifth day of treatment and lasted for a week. THONNARD-NEUMANN (1932, **29**, 708) and DRENOWSKI (1932, **29**, 709) have also noted the occurrence of abdominal pain, but were inclined to attribute it to plasmoquine which was being given in addition. DE MELLO and his colleagues (1933, **30**, 79) have found fatty degeneration in the livers and kidneys of rabbits and cats poisoned with large doses of atebrin. A yellow staining of the skin and conjunctiva appears occasionally in patients who are under treatment, but this is quite distinct from any toxic action, and is due to the staining properties of the drug. GREEN (1932, **29**, 707) has found that it is especially likely to occur in cases where excretion of the drug is so long delayed that none appears in the urine earlier than the fourth day. The yellow staining may last for as long as two or three weeks (SIOLI, 1932, **29**, 705).

Persistence in the Body.

Quinine disappears quickly, but atebrin remains in the body for a long time: GREEN (1932, **29**, 707) found it in the urine for eight or nine days after the conclusion of a seven-day course; JARVIS (1933, **30**, 81) examined the urine of five patients, also after a seven-day course, and found that it was present for an average period of 26 days, in one instance it persisted for 37 days; NEUMANN and LE DOUX, of the United Fruit Company (1933, **30**, 61) have found it present 36 days after the last dose. It is a simple matter to detect atebrin in the urine. GREEN (1932, **29**, 707) recommends, for routine work, adding sulphuric acid and heating, which in the presence of atebrin gives a characteristic yellow colour, best seen by looking down the test tube from above. In the more delicate test recommended by the manufacturers, the alkalinized urine is extracted with ether, this extract is then evaporated and the residue is dissolved in strong sulphuric acid, forming a yellow, highly fluorescent solution.

Possible Prophylactic Action.

It has been suggested that its property of persisting in the body may render atebrin a useful prophylactic, and NAPIER AND GUPTA (1932, **29**, 707) have brought forward some evidence in support of this.

No Action on the Viability of Crescents.

Atebrin does not affect the viability of crescents; GREEN (1932, **29**, 707) successfully infected anopheles of several species by feeding them on patients at the end of a seven-day course of treatment.

Prevention of Relapses.

A most valuable property of atebrin is the power to prevent relapses which it appears to possess to an extent unknown in any other drug. GREEN (1932, **29**, 707) treated 21 cases with no relapses, while there were 13 relapses among 34 controls treated with quinine. JAMES and his colleagues (1932, **29**, 695) treated 15 cases with 0·3 gram daily for five days, and in only one did it fail to effect a permanent cure; four of them were chronic relapsing cases who had already taken several courses of quinine treatment, and two had had blackwater fever. Five cases, infected at Horton with the malignant " Rome " strain of *P. falciparum*, had no relapses after a five-day course of atebrin, but two controls who were treated with quinine continued to relapse frequently. SIOLI (1932, **29**, 705), THONNARD-NEUMANN (1932, **29**, 708), HOOPS (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1932, **26**, 289–294), DE MELLO, BRAS DE SA & DE AZEVEDO (1933, **30**, 79), JARVIS (1933, **30**, 81), and others, have had similar experience.

In the Field.

Atebrin has been used with success in the treatment of agricultural labourers in the tropics by the officers of the United Fruit Company in the West Indies, and by HOOPS in Malacca. It is easy to take and has none of the unpleasant attributes of quinine—the bitter taste in the mouth, the tinnitus and deafness. According to GREEN (1932, **29**, 707) the general condition as regards haemoglobin, size of spleen, weight and so on, improves under atebrin treatment as with quinine. A great advantage of atebrin is that a short course of five days treatment appears to be at least as efficient as a long course of quinine. At present, it is expensive; but, according to HOOPS (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1932, **26**, 289–294) the quantity required for a five-day course costs less than an ounce of quinine. Above all, it appears that atebrin offers a greater prospect of complete cure than any other known drug.

Fourneau 710.

Fourneau 710, a yellow powder soluble in water, is a quinoline derivative, which, according to MARCHOUX (1932, **29**, 348) is N-diethylaminopropyl-8-amino-6-methoxy-quinoline. (Plasmoquine is N-diethylamino-isopentyl-8-amino-6-methoxy-quinoline. See 1931, **28**, 1011.)

FOURNEAU and his colleagues concluded from its action on *Haemoproteus orizivorae* of birds that it could be employed in place of plasmoquine. SERGENT (1931, **28**, 1013) showed that its action on *Plasmodium relictum* in canaries equalled that of quinine. MONIER (1931, **28**, 1012) found that it destroyed the parasites of benign tertian malaria, but had no action in subtertian. He concluded that the maximum single dose was 0·02 gram, and that 0·06 to 0·08 gram, in one day, was the optimum amount: larger doses were followed by toxic symptoms. The brothers SERGENT with their colleagues (1933, **30**, 84) treated 20 cases of subtertian malaria with similar doses, but the results were unsatisfactory: it had no effect on the schizonts, and many of the patients suffered from pains in the abdomen, vomiting, or other symptoms of intolerance. SAUTET (*Bull. Soc. Path. Exot.*, 1932, **25**, 1074–91) has concluded, as the result of his investigations in Corsica, that 710, given alone, has little or no effect upon the parasites of malaria, but when it is combined with quiniostovarsol it is effective in all three forms, and rapidly destroys the gametocytes of *P. falciparum*. He recommends two seven day courses consisting of 0·02 gram of 710 and 0·25 gram of quiniostovarsol four times a day, with an interval of five days between the two courses. Some batches of the drug used by him were more toxic than others. SAUTET has also employed another quinoline derivative prepared in Professor Fourneau's laboratory, and known as 574, but the results, so far, have been inferior to those obtained with 710.

The Arsenicals.

The arsenicals, especially *Stovarsol*, are used to a large extent in the French colonies, and are said to be of great value in the treatment of chronic, cachectic cases of malaria. They are active against the benign tertian parasite only, and therefore stovarsol is usually prescribed as *Quiniostovarsol*, which consists of stovarsol with an equal quantity of quinine.

All forms of benign tertian parasites disappear rapidly when stovarsol is given, but the majority relapse. (CIUCA & ALEXA, 1929, **26**, 24; SINTON, BIRD & EATE, 1929, **26**, 379, DE LA CAMARA & MORALEDA, 1931, **28**, 1011) TARDRES (1927, **24**, 742) and SINTON (1928, **25**, 140) have found it inferior to quinine in reducing enlarged spleens. The first injection is often followed by high fever, and CIUCA and ALEXA (1929, **26**, 24) have reported the occurrence of nephritis, with blood and casts in the urine, in 9 out of 20 cases treated. LARGE and BONAVIA (1927, **24**, 270) state that patients treated with stovarsol, soamin or kharsulphan together with quinine do no better than those treated with quinine alone. MORISHITA and NAMIKAWA (1931, **28**, 1010) have reported on the use of *Osvarsan*, an oral antisyphilitic drug made in Japan, with the same constitution as stovarsol. They found it effective in benign tertian malaria, but it did not prevent relapses, nor had it any action upon subtertian or quartan parasites.

Drugs Containing Quinine.

From time to time, proprietary remedies appear which owe their specific action wholly, or in part, to the quinine which they contain. The well-known *Esanofele* consists of quinine, arsenic, iron, and bitter herbs. A new preparation has been put on the market recently, under the name of *Tebetren*. The makers describe it as " combining acridine and quinine derivatives with a derivative of cholic acid." STOUTE (1933, **30**, 84) has reported the successful treatment of 100 cases with it: but the side effects, such as deafness and tinnitus, resembled those of cinchonism, and it is difficult to judge to what extent such preparations differ from simple quinine in their action upon the parasites of malaria.

The Annual Report of the Institute for Medical Research, Federated Malay States, for the year 1931, contains a report on *Malarcan*, according to which it appears to be a proprietary preparation of the same nature as Tebetren, but containing quinidine in place of quinine. " Twelve tablets of malarcan were found to alleviate symptoms and to destroy parasites as effectively as quinine in a dosage of 30 grains. . . . The effect on the gametocytes of *P. falciparum* was, however, negligible and, in view of the fact that the cost of malarcan is approximately six times that of quinine, it is unlikely that its use will become general."

Totaquina is not a proprietary drug, but a preparation of the total alkaloids of cinchona standardized to contain 70 per cent. of crystallizable alkaloids, including 15 per cent. of quinine (1932, **29**, 461). It is not a new drug, but a new name for a standardized cinchona febrifuge, the preparation of which was recommended by the Malaria Commission of the League of Nations with the view of finding a cheaper drug for the treatment of malaria. In order to provide the alkaloids in sufficient quantity, it would be necessary to extend the planting of cinchona, and it was suggested that the hardy *Cinchona rubra* should be grown over wide areas in tropical malarious countries. HENRY (1933, **30**, 77) and others consider that the revival of cinchona planting in the British tropics would merely renew the old trouble of over-production, and, in the long run, would benefit nobody. In addition, they point out that the introduction of synthetic antimalarial drugs may seriously interfere with the demand for the cinchona alkaloids, and that the present is no time to undertake an extension of planting.

HELMINTHIASIS.

MAPLESTONE (P. A.). **The Testing of Anthelminthics.**—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 673–674.

The accompanying table represents those percentages of fertile eggs displayed respectively by D.C.F. and by Stoll's counting technique in a large number (certainly more than 3,395) of stools of inhabitants of Assam and Bengal, a single examination being made by each method.

TABLE II.

	Per cent. positive to Lane, positive to Stoll.	Per cent. positive to Lane, negative to Stoll.	Per cent. negative to Lane, positive to Stoll.
Ascaris ...	91·4	8·12	0·64
Hookworm ...	74·19	25·38	0·43
Trichuris ...	44·89	54·01	1·10
ngylus	22·63	77·37	0·00

"From the above discussion it seems clear that many cases of light helminth infection, such as will be found after treatment by an efficient anthelminthic will be missed by Stoll's technique and discovered by Lane's centrifuge, and that, although Stoll's technique is of undoubted use as a means of diagnosis in cases passing large numbers of eggs, it is not very reliable when the eggs are few, and it may thus give a false impression of the value of an anthelmintic."

The paper shows, too, how important cleanliness is if proper results are to be obtained by D.C.F. *Clayton Lane.*

HALL (Maurice C.). **Specific Anthelmintic Medication.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1932. Sept. Vol. 8. No. 1. pp. 35–50. [Spanish version pp. 51–68.]

Various drugs are considered under the headings of dosage, purgative, other measures, action of drug, contraindications. There are discussed for ascaris—oil of chenopodium, santonin and hexylresorcinol; for hookworms—carbon tetrachloride, tetrachlorethylene and chenopodium; for ascaris and hookworms—chenopodium with carbon tetrachloride or tetrachlorethylene; for whipworms—leche de higuerón and santonin; for threadworms—tetrachlorethylene; for strongyloides —gentian violet and chenopodium; for schistosomes—tartar emetic. There are also considered tapeworms adult and larval, trichinella, filariids, fasciolopsis, clonorchis, fasciola and paragonimus. Thymol has no place in the armamentarium. *C. L.*

LAMSON (Paul D.), BROWN (Harold W.) & WARD (Charlotte B.). **Anthelmintics: Some Therapeutic and Practical Considerations on their Use.**—*Jl. Amer. Med. Assoc.* 1932. July 23. Vol. 99. No. 4. pp. 292–295. [29 refs.]

"If one still retains one's faith in the older remedies, thymol, santonin, betanaphthol, oil of chenopodium, its active principle, ascaridole, or carbon tetrachloride, one is bound to run a certain risk of death, a fair chance of collapse, an acute nephritis from betanaphthol, disturbance of vision with santonin, deafness from oil of chenopodium and necrosis of the liver from carbon tetrachloride."

" Although the death rate may be only 1 : 40,000 from any of these drugs, the deaths are pathognomonic of each substance, and are not due to extraneous factors. . . Hexylresorcinol is the first anthelmintic that we know of which, for any reason, has been given with the object of absorption from the intestinal tract."

[About 14 years ago (this *Bulletin*, Vol. 17, p. 75) CAIUS and MHASKAR showed that when thymol was adequately particulated all was absorbed from the intestine ; those who have given it since that date have surely done so with the intention that it should be so absorbed. It is noteworthy that Lamson and his colleagues give no specific indication of the kind of death pathognomonic of thymol. The reviewer has been equally unsuccessful in a survey of all deaths whose descriptions he could collect and has concluded " since the lesions described differ in every case, except that of the two brothers who died together, they cannot reasonably be attributed to thymol."] Regarding hexylresorcinol [this *Bulletin*, Vol. 29, p. 56] the authors write here,

" Having lately introduced a new anthelmintic ourselves, we are in the early period of enthusiasm in which we hope to find that it will prove to be of value, but already unexpected complications have arisen and it remains to be seen whether this substance will survive as well as its predecessors. . . . Sharpe and Dohme, who control this substance, have been so bothered by complaints of children chewing up the pills [and obtaining extensive though superficial burns of the mouth] that we understand that hexylresorcinol has been withdrawn from the general market although it is still supplied to health boards." *C. L.*

BROWN (H. W.). **The Treatment of Ascariasis and Trichuriasis with Hexylresorcinol Pills.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 602–608. With 5 graphs.

" On account of hexylresorcinol reacting with gelatin its administration in hard gelatin capsules has been found impractical particularly in hot moist regions where parasitic worms are most prevalent. Sugar-coated pills of crystalline hexylresorcinol have been made to overcome this difficulty. They are, when kept in bottles, unaffected by climatic conditions. These pills each containing 0·2 gram of the drug have been administered to 650 patients to ascertain their effectiveness as compared to hexylresorcinol in hard gelatin capsules against ascaris and trichuris. The dosage of 0·1 gram per year of age up to 10 years and 1·0 gram to everyone above this age was used. They were treated early in the morning on an empty stomach and were allowed no food for 4 to 5 hours afterwards. An average reduction of 90 per cent. ascaris and 32 per cent. trichuris was obtained with the above doses. Two doses of hexylresorcinol three weeks apart reduced the ascaris egg count 96 per cent. and made 93 per cent. of the subjects entirely free of this parasite.

" In young children with unusually heavy infestations of ascaris it is very difficult to remove all the worms with a single treatment using the scale of dosage outlined. In these cases one can give them an extra pill (0·2 gram hexylresorcinol) or repeat the standard dose two weeks later if their stools still contained ascaris eggs.

" With the exception of local irritation in the mouth in one of two children who chewed up the pills, and an occasional case of slight epigastric discomfort and vomiting, no toxic manifestations occurred. As pointed out in our previous publications hexylresorcinol precipitates proteins, and if the crystals come in contact with the mucous membranes of the mouth a superficial " burn " will occur. This is however never deep. On account of the whitening of the mouth and possible desquamation of epithelium the appearance may be alarming. None of these children who chewed up pills paid any attention to this occurrence on account of the local anaesthetic effect of the drug and willingly returned for a second treatment three to four weeks later. It is certain that many complaints will be made on account of the improper administration of this drug. We feel however that this is in no way a contra-indication to its use as an anthelmintic."

Lack of discipline in feeding nullifies results. The most striking example of this cited by Brown is that of a family of 8 in which after treatment there was no reduction of eggs in counts made by Stoll's method. They " later admitted eating and when treated correctly a second time passed over 90 per cent. of their worms." *C. L.*

AZIM (M. Abdel). **Investigations on the Anthelmintic Power of Hexylresorcinol.**—*Jl. Egyptian Med. Assoc.* 1932. Sept. Vol. 15. No. 9. pp. 635–637.

The drug was given in chocolate-coated pills on an empty stomach in the morning in dosage of 1·4 gm. for an adult and 0·8 to 1·2 gm. for children under 12. Egg counts were made by Stoll's method and there was a considerable discrepancy, which could not be explained, between the number of ova and the worms passed. For *A. duodenale* the drug proved very unsatisfactory ; of 26 cases one showed no ova afterwards, the rest showed as many eggs as before or at most a slight diminution in their number. For ascaris, enterobius and trichuris the results were better ; when it was given for heterophyes to dogs, the flukes were numerous and in good condition when the hosts were killed later.

C. L.

MAPLESTONE (P. A.) & MUKERJI (A. K.). **Hexylresorcinol as an Anthelmintic.**—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. pp. 610–612.

Hexylresorcinol, 1 gm., was given in hard gelatin capsules in hospital under strict fasting. In 21 ascaris cases there was an egg reduction by Stoll's original counting method of 94 per cent. and a cure rate of 66·6 per cent. For hookworms the figures were 71·4 and 7·7 only, cure being determined by D.C.F. used at least 10 days after treatment. The latter method they consider much the more valuable of the two in view of the severe poisoning to which the worms have been subjected, and the resultant interference with oviposition. No head was recovered in 10 cases of *Taenia saginata* infection but 5 reported no recurrence over 3 months later. The drug costs 30 shillings an ounce in India. *C: L.*

WRIGHT (Willard H.) & SCHAFFER (Jacob M.). **Critical Anthelmintic Tests of Chlorinated Alkyl Hydrocarbons and a Correlation between the Anthelmintic Efficacy, Chemical Structure and Physical Properties.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 325–428. With 2 figs. [55 refs.]

In the writer's conclusions to this long and detailed paper the sentences which are believed to be most important for medical men seem to be the following :—

"Critical anthelmintic tests for intestinal parasites of the dog have been carried out with the following chlorinated alkyl hydrocarbons: N-propyl chloride, n-butyl chloride, n-amyl chloride, n-hexyl chloride, 2-chlorbutane, 2-chlorpentane, 3-chlorpentane, tertiary amyl chloride, ethylidene chloride, n-butylidene chloride, propylene chloride, trimethylene chloride, amylene dichlorides, 1-2-3 trichlorpropane, trichlorethane, s-tetrachlorethane, pentachlorethane and trichlorethylene."

"Gross pathological alterations of varying intensity in the gastro-intestinal tract, the liver and the kidneys of the treated dogs were associated with nearly all of the compounds used in the present tests."

"Histological changes in the livers of treated dogs were associated with nearly all compounds tested. Histological changes in the kidneys were apparently associated with the administration of some of the compounds."

"The data presented in this paper warrant the conclusion that anthelmintic efficacy of chlorinated alkyl hydrocarbons against *A. caninum* is intimately linked with water solubility which varies with the chemical structure of the molecule and that the anthelmintic efficacy is not solely dependent on the halogen concentration or on the position of the chlorine atom or atoms in the molecule. With a single exception those compounds having water solubilities between 1 : 1,250 and 1 : 5,300 showed a high degree of anthelmintic efficacy for hookworms in the dog regardless of the halogen concentration or the position of the chlorine atom or atoms in the molecule. Water solubility is, therefore, the factor most definitely correlated with the anthelmintic efficacy of chlorinated alkyl hydrocarbons for hookworms." *C. L.*

DE RIVAS (Damaso). **Intestinal Parasitism. Diagnosis and Treatment.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 477–492. With 4 figs.

The method of diagnosis is a modified Telemann technique. The customary striking microphotographs which illustrate most claims for excellency in the working of a concentrative technique are forthcoming. Treatment was by intraduodenal or rectal lavage according as to the parasites' estimated nearness to one or other end of the alimentary canal, the temperature of the fluid being 45°C. to 47°C. For the front end of the gut there is preliminary injection of 1 to 2 oz. of equal parts of glycerine and 30 per cent. magnesium sulphate, and the fluid is normal saline; for the hinder end a copper sulphate solution, 1 in 5,000, is used [see this *Bulletin*, Vol. 27, p. 160]. *C. L.*

ALEXEIEFF (Georges). Sur l'hématopoièse dans les helminthiases. Sur la question de l'origine des éosinophiles. [**Blood Formation in Helminth Infections.**]—*C. R. Soc. Biol.* 1932. Oct. 28. Vol. 111. No. 32. pp. 355–358.

The bone marrow was investigated by puncture with a trocar, under a local anaesthetic in adults, in 16 cases of eosinophilia, 12 being infected with helminths (*Taenia saginata* 7, *Fasciola hepatica* 3, *A. duodenale* 1, hydatid of liver 1) and 4 not, though one of the last had amoebiasis. In 13 the medullary type was neutrophil normoblastic, in 2 youths infected with taenia there was predominance of myelocytes and neutrophil promyelocytes, while in one with grave hookworm anaemia erythroblasts and young myelocytes and promyelocytes predominated. Excess of eosinophils or of young forms was always present where there was a blood eosinophilia and sometimes when there was not. Conversely in kala azar with disappearance of eosinophils in the blood they disappeared from the marrow, and when, after treatment, they reappeared in the blood they reappeared in the marrow also. By a stop on the canula too deep a perforation of the sternum was prevented.

C. L.

JOURNAL OF PARASITOLOGY. 1932. Dec. Vol. 19. No. 2. pp. 151–182.—**Program and Abstracts of the Eighth Annual Meeting of the American Society of Parasitologists, Atlantic City, New Jersey, December 28, 29 and 30, 1932.**

Mary Scott SKINNER'S examinations make *Diphyllobothrium cordiceps* of gull and pelican a synonym of *D. latum.*

Marcos A. TUBANGUI found first intermediate hosts of *Euparyphium ilocanum* in *Planorbis compressus* and *P. umbilicalis.* Metacercariae encyst in the walls of the mantle cavity of these snails and of *Bulinus hungerfordianus* and *Lymnaea peregra.* Cysts fed to clean rats developed into the adult. The habit of eating raw or rawish snails prevails where the fluke is common in man.

On morphological grounds it is contended by J. H. SANDGROUND. that no distinction can be drawn between *Onchocerca volvulus, O. caecutiens, O. gibsoni* and several presumptive bovine species.

Microfilaria ozzardi has been found by O. R. McCOY in the blood of 44·5 per cent. of 119 Indians in the Tuira River basin, Darien Province, Panama. *C. L.*

BRITISH MUSEUM (NATURAL HISTORY). **Instructions for Collectors. No. 12.—Worms.**—22 pp. With 19 figs. 1932. London. [6d.]

The instructions include descriptions, sufficient for general recognition, of the main groups of worms, where to look for them, how to collect, preserve, label and pack them for transport, together with a list of the necessary equipment. These instructions are clear and excellent, as are the figures which illustrate them. *C. L.*

HUMPHREYS (R. M.). **Vesical Schistosomiasis in the Gezira Irrigated Area of the Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 241–252.

Irrigation from the Sennar dam across the Blue Nile was begun, in 1925, of 490 sq. miles of the low lying flat Gezira Province, situated between the Blue and the White Nile. Before this time schistosomiasis was almost absent. Bilharzia-carrying molluscs first appeared in the irrigation canals 18 months after their opening, but by another year were present in all of them ; they breed in this latitude throughout the year. But these snails appeared also in pools 20 miles from the river and 30 miles from any canal, brought there it is believed when young on the legs of ducks and wading birds. Moreover the Sudan is entered yearly by some 25,000 persons and 8 to 24 per cent. of them were found at the quarantine stations on the White Nile and at Wadi Halfa to be infected with vesical schistosomiasis.

The measures taken to prevent the spread of schistosomiasis were : (1) Elimination of the human carrier by urinary examination and treatment with tartar emetic of all immigrants, continued till eggs were no longer viable. The immigrants from the west were of two sorts : young males from Western and French Sudan earning money to buy a wife—useful but roving labour; leisurely pilgrims working their way from British West Africa to Mecca and back again. The effectiveness of the quarantine stations is shown by the following figures: In 1926–7, 14·6 per cent. of immigrants examined in the Gezira area itself were infested, and 2 years later the percentage was 1 only. (2) Prevention of contamination of canals by official prohibition aided by two pamphlets, one illustrating acquisition of the disease, the other a religious decree by the Grand Mufti in the Sudan forbidding fouling of the canals. (3) Destruction of the molluscs in the canals, $\frac{1}{8}$ of the total length of these being completely dried and re-excavated yearly, and the rest, still holding water, so treated with sizolin, a commercial carbolic acid, that its strength in them was 1 in 20,000. No *Bullinus* or *Planorbis* species has been found to survive this procedure. (4) Trapping of snails was too tedious. (5) Ducks were too tempting prizes to wandering cotton pickers to allow of their general use. In spite of the abundant introduction by irrigation of host snails these measures proved most effective; for three surveys of 12,000 to 15,000 persons yearly showed a fall of percentage of infection in local natives from 0·3 to 0·07 for men and 1 to 0·6 in children, and in non-local men from 4·3 to 0·7. *C. L.*

DAY (H. B.). **Bilharzial Cirrhosis. (Egyptian Splenomegaly.)**—*Jl. Trop. Med. & Hyg.* 1933. Jan. 16. Vol. 36. No. 2. pp. 17–23. With 4 figs. [14 refs.]

The clinical and pathological features of this affection closely resemble those of Katayama disease caused by *S. japonicum.* The main lesions of schistosomiasis are set up by the ova, and in solid viscera (liver and pancreas) the eggs cannot escape and finally induce fibrosis. With few eggs, repair balances damage and function is unimpaired; with more of them, a multilobular cirrhosis ensues; with many worms and many ova, periportal pipe-stem cirrhosis is produced. There is a preponderance of lateral-spined over terminal-spined eggs of 4 to 1 as found by FERGUSON. The liver shrinks and ascites appears. The splenomegaly is dependent on venous stagnation, is not proportional to hepatic enlargement and may be influenced by involvement of the splenic vein, particularly in that part of its course where it is embedded in the pancreas, for this organ is frequently infected with worms and ova. Symptoms are considered, particularly the hepatosplenic syndrome, as is diagnosis. Treatment by antimony should be preceded by removal of complicating conditions such as hookworm infection, malaria, and pellagra, supplemented by splenectomy when splenomegaly is gross and long-standing. *C. L.*

GOPSILL (L. W.). **Observations on Schistosomiasis in the Lower Shire District.**—*Nyasaland Protectorate Ann. Med. Rep. on Health & San. Conditions for Year ending 31st December, 1931.* Appendix II. pp. 1–3.

The urine was found heavily infected with eggs of *S. haematobium* in 400 of 500 persons who had no urinary symptoms at all. The snail implicated is *Melanoides tuberculata* which was present in thousands in the muddy but not the sandy parts of the river. It was found in mud 5 feet below the dried river bed. Infected snails disappeared when the river rose or fell suddenly as well as when it was at its lowest level. This species has never been found to harbour cercariae when its young are developing nor does it retain these parasites for more than 14 days. It harbours 5 types of fork-tailed cercariae of which two seem to be those of *S. haematobium* and *S. mansoni*; no *Planorbis* has been found; and, although these cercariae have failed to infect monkeys and rats, yet "the evidence of the bathing places, and of the high degree of infection amongst bathers in the *M. tuberculata*-infected waters, and the fact that the natives who bathe only in *tuberculata*-free waters remain free from infection, speaks for itself." Eggs of *S. mansoni* were usually found only after prolonged search, but in those who had a history of the passage of bright red blood followed by abdominal pain and dysentery, such prolonged search showed infection in 98 per cent. This history together with a curious bluish tinge to the conjunctiva is held to be definite evidence of that infection, so that a negative stool should be looked on with suspicion. Fouadin in treatment gave good results. *C. L.*

VIALATTE (Ch.). La bilharziose vésicale au Maroc. Le foyer d'Erfoud. [**Endemic Focus of Urinary Schistosomiasis at Erfoud (Morocco).** —*Arch. Inst. Pasteur d'Algérie.* 1932. June. Vol. 10. No. 2. pp. 157–158.

Although a report regarding schistosome infection at Erfoud was in fact filed at the Institute of Hygiene, Rabat, this was generally unknown until six European soldiers, who had been transferred to Fez after serving 6 to 24 months in Erfoud, were found suffering from vesical schistosomiasis. Of the six, four had come for treatment, the two others being so little incommoded that they were discovered only after a routine examination of the whole detachment. *C. L.*

ROBERT (Léopold). Un cas de bilharziose intestinale à *Schistosoma haematobium* chez un Européen. [**European Case of Rectal Bilharziasis due to** *S. haematobium.*]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp 829–831.

An examination of the stool in a man who had been long and energetically treated with quinine showed the terminal-spined eggs of *S. haematobium*. Following rectal lavage by 1 cc. of oil of chenopodium in 100 cc. of olive oil, ova ceased to be found and the man improved in health. Eggs were never found in the urine. *C. L.*

JEWELL (N. P.). **Schistosomiasis.**—*Jl. Trop. Med. & Hyg.* 1932. Nov. 1. Vol. 35. No. 21. pp. 326–328. With 1 chart in text.

Four Europeans who bathed in a pool in northern Kenya suffered from identical symptoms, those in one of them being described in detail. On leaving the water there was severe irritation of the skin. There followed after an incubation period of 20 days irregular fever, dysentery of the amoebic type with one entry "microscopically an amoebic stool," cough, urticaria, cyanosis, high eosinophilia. He had in turn emetine, stovarsol and, on a provisional diagnosis of schistosomiasis, tartar emetic. Ova of *S. mansoni* were found once only, on the 61st day after infection and the tenth day after tartar emetic was begun. Cure resulted. *C. L.*

SNELL (John A.). **Surgical Conditions complicated with Schistosomiasis.**—*Chinese Med. Jl.* formerly *Nat. Med. Jl. China.* 1932. July. Vol. 46. No. 7. pp. 656–660. With 8 figs. on 4 plates.

The possible role of *S. japonicum* in appendicitis, tubercle infection and cancer is discussed. An instance is given where calcified ova were present 18 years after possible exposure to infection. *C. L.*

TUBANGUI (Marcos A.). **The Molluscan Intermediate Host in the Philippines of the Oriental Blood Fluke** *Schistosoma japonicum* **Katsurada.**—*Philippine Jl. Sci.* 1932. Oct. Vol. 49. No. 2. pp. 295–304. With 5 plates. [14 refs.]

The molluscan intermediary of *S. japonicum* being still unidentified in the Philippines, Tubangui found in *Blanfordia quadrasi* (*Prososthenia quadrasi* Möllendorf) a fork-tailed cercaria indistinguishable from that of *S. japonicum.* It infested mice, rabbits, and monkeys. The worms, too, were indistinguishable from *S. japonicum* and the snails were infected from the miracidia of this fluke. *C. L.*

ARCHIBALD (R. G.) & MARSHALL (A.). **A Descriptive Study of the Cercaria of** *Schistosoma mansoni* **in the Sudan.**—*Jl. Trop. Med. & Hyg.* 1932. Sept. 1. Vol. 35. No. 17. pp. 257–259. With 1 coloured plate.

" Some of the recorded studies of the schistosome cercariae are worthless, inasmuch as no attention has been given to LEIPER'S postulate that the identification of any species of cercaria is only practically possible by recovering the adult worm from experimentally-infected animals." Lateral-spined ova were obtained by washing faeces from Sudanese cases, the miracidia were allowed to penetrate *Planorbis alexandrinus* from the irrigation canals of the Gezira—a district which may be considered as non-endemic for *S. mansoni* infection. About 8 weeks later cercariae began to escape from the snails. They were applied to the skin of a healthy *C. sebaeus.* On its death 55 days later large numbers of *S. mansoni* were recovered from the mesenteric veins of the intestines. The cercariae, whose identity was in this way exactly determined, are described. There were 5 pairs of penetration cells, 3 pairs of flame cells and 2 pairs of ciliated areas in the body, and one pair of flame cells in the tail stem, so that apart from a few minor differences in measurements their findings confirm those of KHALIL (1922). *C. L.*

ARCHIBALD (R. G.) & MARSHALL (A.). **A Study of Some Cercariae obtained from Molluscs in the Sudan.**—*Parasitology.* 1932. Oct. Vol. 24. No. 3. pp. 344–349. With 5 figs. on 1 plate.

Five cercariae, two being furcocercous, are described as " *Cercaria sudanensis* No. 4 to 8," thus leaving the way clear for valid naming later. *C. L.*

KOURI (Pedro) & ARENAS (Rogelio). *Praticolella griseola,* Pfeiffer, Probable huesped intermediario de la *Fasciola hepatica* L., en Cuba. [*P. griseola,* **Probable Intermediate Host of** *F. hepatica* **in Cuba.**]—*Vida Nueva.* 1932. Nov. 15. Vol. 30. No. 5. pp. 329–346. With 6 figs. English summary.

A broken-off search has been made for the intermediate host of *F. hepatica* in Cuba. Radiae and cercariae believed to belong to this species were found in 15 to 20 snails—*Praticolella griseola* Pfeiffer, which has apparently been imported from the United States. Finances failing, infection tests have not been carried out. *C. L.*

BACIGALUPO (J.). *Limnea viatrix* d'Orb. infectée par des cercaires de *Fasciola hepatica*, à Buenos Aires. [*L. viatrix* **at Buenos Aires Infected with Cercariae of** *F. hepatica.*]—*C. R. Soc. Biol.* 1932. Dec. 9. Vol. 111. No. 38. p. 828.

Cercariae found in *Limnea viatrix*, encysted in the open. The cysts fed to guineapigs produced *F. hepatica* infection. *C. L.*

AKAMATSU (A.). **The Significance of Japanese Weasels as the Last Host of** *Hepar Distoma—Clonorchis sinensis, Distomum Innocu[u]m* **Spalthum.**—*Jl. Public Health Assoc. Japan.* 1932. Oct. Vol. 8. No. 10. pp. 3–4.

Weasels can act as definite hosts of *Clonorchis sinensis*. This YOSHIDA has shown by dissection of wild animals. Akamatsu has produced infection experimentally by feeding them on snails, and has recovered from hepatic ducts and gall bladder from 220 to 1,000 flukes identical in structure with but smaller than (6 to 10 mm. by 0·3 to 0·5 mm.) normal forms. Since wild weasels scatter faeces everywhere, they cannot be disregarded in public health. *C. L.*

VOGEL (Hans). Ueber den ersten Zwischenwirt und die Zerkarie von *Opisthorchis felineus* Riv. [**First Intermediate Host and Cercaria of** *O. felineus.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 558–561.

Vogel has determined the molluscan host of *O. felineus.* It is *Bithynium leachi.* The miracidium does not hatch in water, but the snail eats the egg whose shell is dissolved by its digestive juices and the freed miracidium penetrates the gut and grows into a tubular sporocyst 1·5 mm. long which takes up its position in the wall of the end gut. The rediae enter the digestive gland and grow to 0·5 mm. long. The cercariae are described, and reach the second hosts as observed by CIUREA. *C. L.*

ERHARDT (Albert) & KEIL (Werner). Weinsaurewirkung bei chronischer Opisthorchiasis. [**Tartaric Acid in Chronic Opisthorchiasis.**]—*Arch. f. Experim. Path. u. Pharm.* 1932. Sept 12. Vol. 167. No. 3/4. pp. 334–337. With 1 fig.

Of the 4 isomers of tartaric acid only d-tartaric acid proved effective in chronic opisthorchiasis of cats. It is considered that in the body this is changed, at least partly, into the stronger dioxy-mateic acid. The further oxidation product dioxy-acetic acid was inert. In spite of the general view that these 4 isomers are physiologically and pharmacologically alike, their biological action differs. *C. L.*

ERHARDT (Albert). Chemotherapeutische Untersuchungen an der Opisthorchiasis der Katzen. II. [**Chemotherapy in Opisthorchiasis of Cats.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 610–616. With 2 charts.

For its possible bearing on the treatment of clonorchis infection it may be noted that against opisthorchis in cats fouadin gave good results without the strong local reaction of antimony tartrate. Neostibosan was without effect. *C. L.*

DÉVÉ (F.). Trente-deux années d'étude de l'échinococcose. [**Thirty-Two Years Study of Hydatids.**]—*Prensa Méd. Argentina.* 1932. Aug. 30. Vol. 19. No. 9. pp. 523–534.

An interesting and entertaining epitome of Dévé's life work on hydatid. His proof by experiment (the need of which he insists on over and over again) of the grafting of hydatids over the peritoneum by introduction of scolices from a hydatid, and his other studies in his subject; Raphael BLANCHARD, dreaded examiner (he ploughed Dévé in parasitology at his first examination for doctorate) and charming friend; Dévé's views on over-specialism, as when, at the use of the word " scolex " Auguste BROCA at the Société de Chirurgie pleasantly exclaimed " I am no botanist " ; and his defence of his own speciality —32 years devoted to the study of hydatid cysts—to the benefit of many. *C. L.*

i. DÉVÉ (F.). L'évolution vésiculaire du scolex échinococcique. Son importance en pathologie hydatique. [**Development of Hydatid Scolex.**]—*Prensa Méd. Argentina.* 1932. Sept. 10. Vol. 19. No. 10. pp. 598–607.

ii. ——. Le formolage antitoxique des kystes hydatiques. [**Use of Formol in Treatment of Hydatids.**]—*Ibid.* Sept. 30. Vol. 19. No. 12. pp. 723–734. [Refs. in footnotes.]

iii. ——. Rupture spontanée d'un kyste hydatique du foie dans l'abdomen. Hydatopéritoine. [**Spontaneous Rupture of Liver Hydatid in Abdomen.**]—*Ibid.* Sept. 20. Vol. 19. No. 11. pp. 655–664.

i. The fertility of *Taenia echinococcus* is enormous. Each last segment of a strobile contains 500–800 eggs and a hydatid cyst of 2 litres capacity growing from one of these eggs may contain about 2 million scolices. Destruction in nature must be enormous. Moreover when one of these cysts ruptures into the abdominal cavity, each scolex can become a secondary hydatid cyst grafted on to the peritoneum. This evolution can be followed by inoculating such scolices directly into rabbits or by placing them in a collodion sac inserted into the peritoneum of a rabbit. The scolex swells by increase of its interstitial fluid, which collects in the centre, surrounded by a germinative membrane nearly always containing at one point in a disordered heap the 32 to 36 hooks of the original scolex. Each such vesicle is the biological equivalent of an original cyst coming from a hexacanth embryo. These daughter cysts grown within the same collodion sac vary greatly in size ; they have individuality in the matter of growth.

ii. When a cyst ruptures, or its deliberate puncture allows of leakage into the peritoneal cavity, there is risk of anaphylaxis and of wide dissemination of scolices throughout the abdomen. As a killer of the scolex Dévé has since 1903 advised injection of " formol," 1 per cent., into the emptied cyst, and the leaving of it there for 5 minutes, experiment showing that this strength is fatal to scolices. In view of the difficulty of complete emptying of the cyst the strength has since been raised to 2 per cent. which in that time does no harm to the host. The operation can then proceed without risk of seeding the peritoneum with cysts. The prevention of anaphylaxis is aimed at by precipitation of albumin through the means of a newer preliminary injection, namely 2 gm. of potassium ferrocyanide in 970 cc. of water.

This is sterilized at 105° for ten minutes and *at the moment of use* there is added commercial formal 20 gm. and " acetic acid " 10 gm.

iii. A case illustrates spontaneous painless rupture of a hydatid of the liver into the peritoneal cavity. It freed many scolices which were attacked by swabbing and flushing of the abdominal cavity. X-rays showed a few days later that a second cyst was present. This was operated on 4 years later with preliminary formolage and yet another cyst as big as a fist removed from under the mesocolon. A slight urticaria followed the operation. *C. L.*

DÉVÉ (F.). Raréfaction de l'échinococcose ovine en Normandie. Ses causes—Ses conséquences. [**Diminution of Sheep Hydatid Infection in Normandy.**]—*Prensa Méd. Argentina.* 1932. Sept. 10. Vol. 19. No. 10. pp. 593–598.

Human and sheep hydatid infections run parallel. In Normandy there has latterly been a great fall in sheep infection as displayed in slaughter houses, while of human infection Dévé saw an average of 7 cases in the 10 years ending 1914, of 5·1 in the ten years ending 1928, of 3·3 in 1929–31 and none in the first 6 months of 1932. The causes are several. There were 16 million sheep in France in 1913, 9 million in 1930 ; the number slaughtered has notably lessened ; the number of nomadic flocks, wandering from common to common for pasturage under a shepherd and pent in by numerous dogs, is 70 per cent. less, sheep being increasingly kept in hedged fields. All these lessen chances of transference from dog to sheep. Regarding that from sheep to dog, the exclusion of dogs from abattoirs, though not now perfect all over France, is far more strictly observed. In so far as sheep and dog are isolated from one another, so will human hydatid incidence lessen. Perhaps by dog-proof fences it may be possible to effect this in the Argentine, following the example of the United States. *C. L.*

DÉVÉ (F.). L'échinococcose multiloculaire considérée du point de vue de la pathologie comparée. [**Comparative Pathology of Multilocular Hydatid.**]—*Prensa Méd. Argentina.* 1932. Sept. 20. Vol. 19. No. 11. pp. 664–672. [11 refs.]

Regarding the identity or otherwise of the multilocular hydatid of cattle with the alveolar hydatid of man, Dévé points out that there are nearly always morphological differences between the two forms. Macroscopically these are : (1) The bovine form has large intercommunicating loculi rarely as small as a pea, looks like a cauliflower, has gelatinous matter within these, and is invariably sterile : the human form looks worm eaten, its cavities are rarely as big as a pea, it is not always sterile ; exceptions are a case reported by Dévé in 1912 and one by DEW of Melbourne in 1931. (2) The bovine form does not infiltrate, nor does it produce metastases : the human form runs processes into vessels and lymphatics with sometimes adenitis in the corresponding lymph glands or metastases at a distance reproducing the character of the original ; exceptionally the bovine form penetrates veins but never lymphatics. (3) The human form has a tendency to central necrosis ; the bovine has not ; there are two recorded cases of central necrosis in multilocular hydatid. Microscopically the essential differences between multilocular and alveolar hydatid are :

(1) There is cuticle formation in the bovine form, whereas in the human form the germinal layer runs out into the tissue in bare processes. (2) As to the host's reaction, in the human form the processes produce local necrosis : in the bovine form 3 zones are formed near the parasite tall cells simulating cylindrical epithelium, a central zone of granulation tissue with many leucocytes, an outer fibrous zone with concentric arrangement ; as an exception, in DEW's case of 1931 the trizonal arrangement was observed in the liver of man.

Dévé, feeling that his attitude on this matter has not been rightly represented, recalls what he wrote in 1912 which may be rendered thus :—It must then of necessity be admitted that alveolar hydatid is an affection common to man and animals and that, notwithstanding certain differences of appearance in growth, multilocular hydatid is the representation in animals of alveolar hydatid.—The difference, it now becomes clearer, is due to the surroundings of the larval parasite but, as Dévé noted 20 years ago, only experiment can finally settle the matter. *C. L.*

WITENBERG (G.). Zur Kenntnis der Verbreitung von Echinokokkus und Trichinen in Palästina. [**Distribution of Echinococcus and Trichinella in Palestine.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Jan. Vol. 37. No. 1. pp. 37–41. With 1 fig.

Taenia echinococcus is present in 1 in 5 of ownerless dogs in Jerusalem. Artificial infection of cats and foxes (*Vulpes nilotica*) has not been successful, but jackals are naturally infected in Palestine (up to 100 strobiles in one animal) and have been artificially infected also. Palestinian cattle have been found infected to 12 per cent. and those imported from Cyprus to 80 per cent., though many cysts in the latter are barren. Great variations in size of hooks carried by scolices from the same naturally infected dog are figured.

Trichinosis with one exception is unknown in Palestine, swine flesh being forbidden by religion both to Jews and Mohammedans, the exception being an epidemic among Beduins near the Huleh lake. A measly pig has been killed in Bethlehem and a heavily infected ichneumon (*Herpestes ichneumon*) in the desert near Beersheba. *C. L.*

STREIGNART. Un cas de ladrerie révélé par les rayons X. [**Measles disclosed by X-Rays.**]—*Ann. Parasit. Humaine et Comparée.* 1933. Jan. 1. Vol. 11. No. 1. pp. 17-19. With 1 fig.

X-rays applied in the diagnosis of a tibial fracture revealed shadows corresponding in appearance and size to those thrown by calcified *Cysticercus cellulosae*. Permission to remove muscle was refused. *C. L.*

KAWANISHI (K.). **Experimental Studies on the Morphological Changes of the Blood and Clinical Symptoms in Infections with *Taenia solium* of Man.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Sept. Vol. 31. No. 9 (330). [In Japanese. English summary pp. 93–94.]

Four persons deliberately infected with *Cysticercus cellulosae* showed some looseness and abdominal pain. Segments appeared after 65 days on the average. There was some gastric hyperacidity and some lessening of erythrocytes and haemoglobin but no other change in them. There was slight leucocytosis from the 15th to 17th week after infection and an eosinophilia of 15 per cent. at most, the bulk of the leucocytosis being neutrophils (reaching 70 per cent.) while the lymphocytes simultaneously fell to 16 per cent. The other leucocytes were unaltered. The percentage of cysticerci growing to strobiles was 87. *C. L.*

CHI-SHEN (Liang). *Taenia solium*—**Report of a Case.**—*Chinese Med. Jl.* formerly *Nat. Med. Jl. China.* 1932. July. Vol. 46. No. 7. pp. 676–678.

This is the first case of infection with *T. solium* recorded since 1914 in the Cheloo University Hospital; only 9 cases of taeniasis including *C. cellulosae* have been observed in the Peiping Union Medical College in 10 years. *C. L.*

LE MOULT & PIROT (R.). Un cas de téniasis multiple. [**Case of Multiple Taeniasis.**]—*Gaz. hebd. Sci. Méd. de Bordeaux.* 1932. Sept. 18. Vol. 53. No. 38. pp. 595–596.

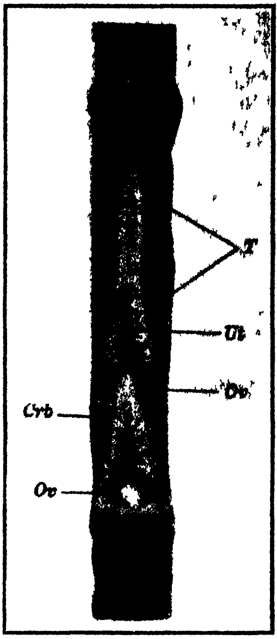
In a man whose stool contained *E. coli* cysts, hookworm eggs, and many onchospheres of *T. saginata*, pelletierine produced 1·25 kg. of tapeworm in which 7 heads were found. He had had some fever, colic, and traces of albumin in the urine. *C. L.*

WATERS (Henry S.) & O'CONNOR (F. W.). *Diphyllobothrium latum,* **Sources of Native Infestation in New York City. Report of Three Cases.**—*Jl. Amer. Med. Assoc.* 1932. Dec. 3. Vol. 99. No. 23. pp. 1941–1942.

Three Jewish children of 5, 2 and 3 years, born in New York and never having eaten fish imported from Europe, had passed segments of *D. latum* from the ages of 13 and 18 months for the last two. Two had eaten "gefüllte" fish raw; in the third there was no history of this. In all cases pike was used for food. Most of the pike, carp and white-fish in New York comes from Manitoba and the U.S. Great Lakes region. *C. L.*

TALYSIN (Th.). *Dibothriocephalus strictus* n. sp. Menschenparasit des Baikalgestades. [*D. strictus*, **Human Parasite on the Baikal Shore.**]—*Ztschr. f. Parasitenk.* 1932. Sept. 5. Vol. 4. No. 4. pp. 722–729. With 7 text figs.

In material produced by giving anthelmintics on a mass scale to persons found passing Diphyllobothrium eggs occurred the 3 strobila on which this new species is based. Two were complete, measuring 47 cm. and 19·5 cm. long respectively, the third was incomplete with a length of 30 cm. The greatest breadth in all 3 was 4 mm., and further back the proglottids were 7 mm. long by 1·5 to 2 mm. wide. The internal structure was that of the genus with the zigzags of the uterine coils more separated than usual. A marked feature of the illustrations is the presence of two sets of genitalia tandem in the same segment, and in one figure there is more than room for a third. The eggs measured 0·054 to 0·057 mm. long by 0·04 mm. broad. [Segment illustration on following page.] *C. L.*



Segment of *D. strictus* showing two sets of genitalia. 9/1.
Crb. Cirrus-sac, *Ov.* Ovary, *T* Testes, *Ut.* Uterus.
[Reproduced from the *Zeitschrift für Parasitenkunde*]

PODJAPOLSKAJA (W. P.) & GNEDINA (M. P.). *Diphyllobothrium tungussicum* n. sp. ein neuer Parasit des Menschen. [*D. tungussicum*, **a New Human Parasite.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Dec. 15. Vol. 126. No. 5/6. pp. 415–419. With 6 figs.

In Northern Siberia along the river Nischnaja Tunguska, (?) tributary of the Yenesei river, operculated eggs were found differing to the extent of 23·6 per cent. from those of *D. latum* in that they had an alveolar shell and were rather larger, namely 0·072 to 0·075 mm. long and 0·048 to 0·051 mm. wide. On disinfestation as many as 477 scolices, apparently of the new worm, were obtained from one case. Some figures are given with curious exactness. Total segments 502; first segment showing sexual elements is number 118; ripe proglottids measured 0·56 to 0·63 mm. long and 3·56 mm. broad. *C. L.*

BONNE (C.). **A Few Remarks on Two Rare Parasitic Diseases in the Malayan Archipelago. A. Chromoblastomycosis. B. Sparganosis.** —Reprinted from *Far Eastern Assoc. Trop. Med. Trans. Eighth Congress, Bangkok, 1930. Dec.* pp. 184–187. With 4 figs. on 2 plates

Sparganosis—Autopsy at Batavia on a labourer from Sumatra revealed infarcts of the right lung, left half of the brain and kidneys, and a local right iliac peritonitis with no lesions in appendix or gut. In an artery of the lung lesion a long pale body was found, taken by the assistant to be a white blood clot, but the microscope revealed in it particles which on adding acid gave off gas. Dissection showed in another artery of the lung infarct a living contractile body 25 cm. long by 2 to 3 mm. broad with an apical cleft; in formalin this contracted into the typical shape of the sparganum head. In discussion YOKOGAWA suggested that the parasite had gained access to the vascular system from the brain. *C. L.*

SUMI (I.) & KAWASAKI (S.). **Influences of Ascaris-Infection on the Growth of School Children.**—*Jl. Oriental Med.* 1932. Dec. Vol. 17. No. 6. [In Japanese. English summary p. 73.]

The authors, not accepting previous work on the subject, have divided Manchurian school children [their number is unstated in the summary] into 3 classes:—not infected, infected and untreated, infected and treated. The weights and body lengths were taken at the beginning of the experiment and again 8 months later. The three groups showed no difference in growth. Whether they still remained in their proper classes at the end of 8 months the English summary does not state. *C. L.*

KELLER (A. E.), HILLSTROM (H. T.) & GASS (R. S.). **The Lungs of Children with Ascaris. A Roentgenologic Study.**—*Jl. Amer. Med. Assoc.* 1932. Oct. 8. Vol. 99. No. 15. pp. 1249–1251. With 2 figs.

"While it is not possible to draw definite conclusions, these observations suggest that in children who are infested with *Ascaris lumbricoides* and who show no response to tuberculin tests the widening in the hilar areas with increase in the bronchovascular markings are possibly due to the repeated migration of ascaris larvae through the lungs. They may occur either as the result of the damage done by the larvae themselves or as the result of infection by micro-organisms which invade the pulmonary tissues at the time the larvae escape from the blood vessels into the alveoli. The changes seen on roentgen examination, which have been attributed to the migration of ascaris larvae, are similar to those seen in the childhood type of hilar tuberculosis and may also resemble the changes which occur following repeated nonspecific infections of the lungs." *C. L.*

PENSO (Giuseppe). Sull'azione emolitica dell'*Ascaris lumbricoides* L. [**The Haemolytic Action of** *Ascaris lumbricoides*.]—*Ann. di. Med. Nav. e Colon.* 1932. Nov.–Dec. 38th Year. Vol. 2. No. 5–6. pp. 695–706. [11 refs.]

Studying the three ways in which ascaris may do harm—toxic and irritative, deprivatory, and mechanical or traumatic—the author tested the coelomic fluid, extract of the skin and of the internal organs, *in vitro* and *in vivo* for the haemolytic effect under the first named. The extracts were prepared by maceration and addition of physiological saline. He tested each by adding from 1 drop to 1 cc. of the extract to 1 drop of washed human red cells, the whole being made up to 1 cc. The results were noted at the end of 24 hours at 37°C. Traces of haemolysis were seen even with the smallest amounts and quite distinct with 4–8 drops upwards of the extracts.

For *in vivo* experiments he injected a rabbit intravenously with 18 cc. of the extract in ten days; no obvious symptoms resulted but on killing the animal he found haemosiderin in the spleen.

He concludes therefrom that ascaris contains a haemolysing substance which is present in the coelomic fluid, the skin and internal organs; that this is a secretion by the worm for "the saline used for washing the worm acquires the haemolytic property." (See also SCHWARTZ, this *Bulletin*, 1919, Vol. 14, p. 154). *H. H. S.*

ROW (Y. Suryanarayana). **A Case of Dysphagia due to Round Worms.**—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. pp. 626–627.

A man of 18 had 3 days inability to swallow and was very weak. A gastric washout by tube under chloroform followed by magnesium sulphate led to the passage of an ascaris and to the giving of 5 grains (0·3 gm.) of santonin. 148 ascaris were passed and deglutition gradually became normal within a week. *C. L.*

MIYAMOTO (Masaji). **A Case of Psoitis caused by Round-Worms, with Reflections on the Role of Ascaris in Practical Surgery.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Oct. Vol. 31. No. 10 (331). [In Japanese. English summary pp. 103–104.]

In the case reported left iliac pain appeared soon after delivery, the condition was diagnosed as psoas abscess and on operation a female ascaris appeared, two more being discharged during after-treatment.

C. L.

FÜLLEBORN. Zusammenfassung des praktisch Wichtigsten ueber Klinik und Bekampfung der Spulwurminfektion. [**Summary of Knowledge of Ascaris Infection and its Control.**]—*Klin. Woch.* 1932. Oct. 1 & 8. Vol. 11. Nos. 40 & 41. pp. 1679–1684; 1716–1720. With 6 figs. [100 refs.]

A valuable summary of present knowledge on ascaris infection. *C. L.*

CRUZ (Walter Oswaldo). Pathogénie de l'anémie dans l'ankylostomose. Importance prépondérante d'une perturbation dans le métabolisme du fer dans l'organisme. [**Anaemia in Ankylostomiasis. Importance of Metabolism of Iron.**]—*C. R. Soc. Biol.* 1932. Nov. 4. Vol. 111. No. 33. pp. 483–485.

Examination at autopsy of the marrow of the femoral diaphysis in ten pure cases of ankylostomiasis showed macroscopically intense redness with no zones of degeneration. Microscopically, with no haemorrhage or congestion, there was good production of leucocytes with predominance of eosinophil myelocytes; the production of red corpuscles took place in many small foci, there were very many orthochromatic, haemoglobin-containing erythroblasts with pycnotic nuclei; whole more-developed cells were very rare, but younger cells very common; their development appears then to cease at this particular point. In malaria, on the contrary, the focal erythroblastic activity is carried on to all stages, there being predominance of karyokinetic forms and of those containing nuclear residues. Again, after disinfestation by removal of 529 hookworms, no hookworm eggs being then found in the faeces, an iron starvation produced by cutting out meat and eggs from the diet was followed by no improvement in the blood condition during a month, while after three weeks of iron treatment it became almost normal. It is concluded that the small haemorrhages produced by hookworms are insufficient to cause the anaemia and that this condition is simply due to disturbance of iron metabolism.

[That iron is essential for production of erythrocytes is long-established. That the loss to the body of blood, and so of iron, caused by hookworms cannot be accepted as being small is shown conclusively by the observations of FÜLLEBORN & KIKUTH (this *Bulletin*, Vol. 28, p. 234) and WELLS (*l.c.*, Vol. 29, p. 421). That iron is not lost to but stored in the body in malaria is well known; presumably it is then available when needed for blood reconstruction in malaria, but it is not so available in hookworm infection.] *C. L.*

KAWANISHI (K.). **Experimental Studies on the Morphological Changes of the Blood in Percutaneous Infections with** ***Necator americanus*** **of Man.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1932. Sept. Vol. 31. No. 9 (330). [In Japanese. English summary pp. 91–92.]

Three persons were investigated after percutaneous infections with 150–700 mature larvae. Skin lesions became more marked with repeated infections. One man had bronchitis and pharyngitis for several days after infection, and had many eosinophils in the sputum. Eggs appeared in 57 to 63 days. Erythrocytes fell to 4,000,000 and haemoglobin to 80. Reticulated and polychromatic and basophil erythrocytes increased somewhat. Leucocytosis appeared temporarily and was greater with repeated infection as was eosinophilia (to 50 per cent.), both returning to normal after disinfestation. Neutrophils and lymphocytes fell as eosinophils rose, large mononuclear and transitionals being but slightly diminished. *C. L.*

CORT (W. W.). **Variations in Hookworm Disease.**—*Jl. Parasitology.* 1932. Dec. Vol. 19. No. 2. pp 142–147. [10 refs.]

The line of argument is this. In pups repeated infections may kill or a crisis may occur with rapid loss of worms till few are left—" self cure " as STOLL styled it. When this condition has been reached a deficient diet may allow of heavy infection which a full diet will diminish. Heavy bleedings will have the same effect. The types of hookworm disease in dogs are designated. In conversation DARLING often noted that a general low local infection in man with a few severe cases seemed only explicable on the supposition of an acquired immunity. [DARLING, however, was satisfied that hookworm larvae were evenly distributed in soil and not concentrated in particular spots so that heavy infection could not arise in a lightly infected locality; this *Bulletin*, Vol. 20, p. 254.] If such resistance is postulated moderate infection with lack of sanitation is explained.

" The usual view that such individuals [some heavy infections among very light ones] have been more exposed to infection than the rest of the population is almost always incapable either of proof or disproof. . . . Where the infestation is comparatively low in spite of soil pollution habits and favorable soil and climatic conditions, it seems probable that the development of host resistance is the chief determining factor . . . The severity of hookworm disease in certain areas of Puerto Rico where the people are badly undernourished supports this view."

[This is contrary to the experience of ASHFORD in Porto Rico.] *C. L.*

DELLA CASA (Vittore). Un focolaio di anchilostomoanemia per la prima volta accertato nella provincia di Pesaro. [**Hookworm in the Province of Pesaro.**]—*Arch. Ital. Sci. Med. Colon.* 1932. Sept. 1. Vol. 13. No. 9. pp. 547–551. English summary (3 lines).

The author details three cases, all women, with mild degrees of anaemia. The cause was wrongly diagnosed for some time—as pregnancy, possible tuberculosis—but examination of the faeces revealed ankylostome ova. The reasons for the delay in diagnosis and, incidentally, for placing the cases on record are that all three were of the Commune of Mondolfo (Pesaro Province), that they had never been away from the district and that hookworm infestation had never previously been reported there. *H. H. S.*

FALLON (W. M.). **A Case of Hookworm Disease.**—*Brit. Med. Jl.* 1932. Sept. 10. p. 515.

In a missionary from Nigeria who had been treated for malaria, two blood examinations revealed an eosinophilia of 75 per cent., with haemoglobin 85 and red corpuscles 4,438,000. Faecal examination showed hookworm eggs in large numbers. One treatment of 45 grains [3 gm.] of particulated thymol left few eggs and a second with thymol and oil of chenopodium 1·5 cc. left none. Perhaps a noteworthy point is that when in Nigeria his stool was blackish. *C. L.*

HARPER (P.). **Complications of Hookworm Disease.** [Correspondence.] —*Brit. Med. Jl.* 1932. Sept. 10. p. 535.

Two conditions are mentioned. The first is a polyarthritis with high fever and a general resemblance to rheumatic fever met with in about two cases a year during the last 8 years. The second is a tendency to haemorrhage, a point of surgical, gynaecological and obstetric importance. Both conditions have disappeared on disinfestation. *C. L.*

BIGGAM (A. G.) & GHALIOUNGUI (P.). **Hexyl-Resorcinol in the Treatment of** *Ancylostoma duodenalis* [*sic*] **Infection.**—*Jl. Trop. Med. & Hyg.* 1932. Dec. 1. Vol. 35. No. 23. pp. 353–354.

Fifty cases were treated with doses of 1 cc. and later, to the number of 28, of 2 cc. of tetrachlorethylene ; 26 were cured, 11 after one dose, 12 after two, 2 after three and 1 after four. Diet restriction before and during treatment was severe. The extremely anaemic and debilitated bore it well ; 2 patients had pain and discomfort in the xiphisternal region on swallowing. The use of old or new gelatine capsules or of paraffin made no difference to the results. *C. L.*

DAVID (Norman A.) & JOHNSTONE (Herbert G.). **Heptylresorcinol in the Treatment of Hookworm Infection.**—*Amer. Jl. Hyg.* 1933. Jan. Vol. 17. No. 1. pp. 287–296. [20 refs.]

Authors' summary :

"Thirteen cases of hookworm infestation were treated with heptylresorcinol with the following results. Six cases treated over a considerable period of time with olive oil solutions of the drug were unaffected. Of seven cases receiving the crystalline drug in plain gelatine capsules two were cleared. Of the ten cases who later received phenyl-salicylate ("salol") coated capsules of the drug, 8 were cured. One case of ascariasis was cured by heptylresorcinol in olive oil but one case of trichiuris infestation did not respond to a single treatment of heptylresorcinol in capsules coated with phenyl-salicylate. Better results seem to be obtained when precautions are taken to delay or prevent the absorption of heptylresorcinol. Although only a few cases are here reported in comparison with Brown's study on the effectiveness of hexylresorcinol in hookworm infestation, the findings indicate that heptylresorcinol is not as satisfactory as hexylresorcinol for this purpose." *C. L.*

FOSTER (A. O.) & CORT (W. W.). **The Effect of a Deficient Diet on the Susceptibility of Dogs and Cats to Non-Specific Strains of Hookworms.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 582–601. [10 refs.]

The authors write :—

" Since in earlier work it had been possible to break down the resistance of dogs to infection with *Ancylostoma caninum* due to age and previous infestation, by keeping them for considerable periods on a deficient diet, experiments were planned to see if resistance to non-specific strains of hookworms in dogs and cats could also be reduced by deficient diets. First, mature dogs on a deficient diet were given the larvae of a strain of *A. caninum* which had been shown to be highly infective to cats but only slightly infective to dogs. In five old dogs that came to autopsy after such infections from 7 to 82 worms were recovered, giving percentage developments of from 0·9 to 15·25 per cent. Of five control puppies on a normal diet which were given the same doses of the cat strain larvae as the five old dogs only one became positive with a very light infestation. Since no records are available of old dogs having become infected with the cat strain of *A. caninum*, and since the average infestation of puppies is very low when infected with the same parasite, it seems evident that the effect of the deficient diet was responsible for the increased susceptibility of the experimental dogs to infection with the cat strain of *A. caninum*. An experiment on infecting cats on a poor diet with the dog strain of *A. caninum*, gave percentage infestations significantly greater than had been obtained in the records available on the infecting of mature cats with this strain. The average is also somewhat higher than that recorded for kittens when infected with the dog strain. Experiments with cats on deficient diets are much less satisfactory than with dogs, because the cats are much more easily killed by the poor diets and the experiments have to be much shorter. A few attempts to infect mature dogs on a deficient diet with the larvae of *Necator americanus* were not successful. These experiments suggest the possibility that there may be a relationship between undernourishment and incidental parasitism. Results of this type indicate the importance of the extension of quantitative experimental investigations of the life cycles of parasitic worms in normal and abnormal hosts." *C. L.*

FOSTER (A. O.). **Prenatal Infection with the Dog Hookworm,** *Ancylostoma caninum.*—*Jl. Parasitology.* 1932. Dec. Vol. 19. No. 2. pp. 112–118.

The procedure adopted to prevent postnatal infection was the well-tried one of putting the bitch before parturition in a cage. After their birth the pups were removed twice daily to a clean pail, the cage being meantime washed with hot water and steam and the mother allowed a run in the animal room. A clean burlap bag for bedding was allowed them daily. Three experiments were carried out on pregnant bitches, which received by mouth numbers of infecting larvae. To one of them 5 pups were born ; two died within a week but no worms were found at autopsy. while the other 3 grew up and remained persistently negative to D.C.F. The second bitch was given 2,500 larvae during pregnancy. Her 5 pups showed hookworm eggs to D.C.F. on the 11th day and died of acute ankylostomiasis between the 12th and 18th days, 297 adult worms being recovered. The third bitch received 3,000 larvae during pregnancy, the 8 pups being born at 58 days (5 days prematurely). From a stillborn pup were recovered one " partially developed larva " by direct examination of the organs after maceration, and 5 filariform larvae by extraction. A second died next day and yielded 6 active larvae on extraction. A third provided a welcome meal for its mother who had been on deficient diet for a week. Of the other 5, four showed eggs to D.C.F. on the 11th day and died from the 22nd to the 25th day ; the fifth which had shown no eggs was killed on the 12th day and 82 mature hookworms were recovered from it. The total worm recoveries at autopsy from all five were 635. In all these cases infective larvae had been given to the bitches before as well as during pregnancy and they had all developed some immunity as judged by falling egg numbers. On the other hand a fourth bitch was given 2,000 larvae, 38 days before parturition, and bore 6 pups. When the litter was a week old circumstances brought about the neglect of cleanliness. D.C.F. first showed hookworm eggs in the pups on the 21st to the 28th days, but from the cleanings of the cage on the 22nd day Baermann's method extracted 26 infective larvae. Accordingly the conclusion is reached that where infection occurred in the first three litters, the pups were infected before birth, though development towards adult life did not begin till after it ; but that in the fourth case infection was postnatal. [The examination method by which Looss established the use of the vascular and pulmonary escalators in cutaneous hookworm infection in pups was by massive serial sections. It is greatly adding in O'CONNOR's hands to our knowledge of filariasis. By a repetition of these instructive experiments it seems that it could be used to determine when and in what stage the larvae await their host's birth. The failure of extraction suggests that they have developed beyond the filariform stage.] *C. L.*

BACHMAN (George W.) & RODRIGUEZ-MOLINA (Rafael). **Skin Reactions to *Necator americanus* in Persons Infected with the Common Intestinal Parasites.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1932. Mar. Vol. 7. No. 3. pp. 287–319. [21 refs.]

In this paper the authors analyse the results of 2,901 intradermal tests in Porto Ricans for hypersensitiveness to extracts of *Necator americanus*. The antigen was prepared as a 0·5 per cent. saline extract of dried hook-worm larvae cultivated on charcoal and obtained by the Baermann isolation method. Extraction was made for 12 hours, the extract being subsequently filtered through a porcelain filter and stored on ice. In making the test 0·025 cc. of the test antigen was injected intradermally ; the resulting wheal was measured in 2 diameters at right angles to one another and the results averaged. Any wheal with an average diameter of 0·5 mm. or less was considered negative. The reaction itself, observed within 10 minutes, was characterized by wheal formation, the presence of pseudopods and an erythema ; only occasionally was a delayed reaction noted.

Marked systemic reaction was observed in 2 cases only ; one developed oedema of the eyes, fever and tachycardia. Control antigens prepared from *F. hepatica, A. lumbricoides* and *B. coli* were investigated. Hypersensitiveness to *Necator americanus* test antigen was demonstrated in the 10-minute period in 90–98 per cent. of 1,081 Porto Ricans positive for intestinal nematodes, and the reaction diminished in intensity 5–10 months after treatment. Only 5 per cent. of 115 children under 2 years of age reacted. In 81 per cent. of 1,042 tests on patients negative for intestinal parasites hypersensitiveness was also present. Intradermal tests for *A. lumbricoides* were positive in 92 per cent. of 60 cases tested.

The authors conclude by stating that the measurable characteristics are too variable, and the reactions are not significantly specific for the practical application of the skin test in detecting *Necator americanus* in individuals infected with two or more intestinal nematodes.

N. Hamilton Fairley.

[The primary essential for determining the scientific and clinical value of antigen-based tests is that the diagnostic technique employed should distinguish, as accurately as present knowledge allows, between infected and non-infected persons. In the laborious work here reported Stoll's caustic soda egg-counting method was used for this purpose. Maplestone's completely independent evaluation of its worth in this respect should be consulted (see page 203).—*C. L.*]

FÜLLEBORN (F.). Ueber die Taxen und das sonstige Verhalten der infektionsfähigen Larven von Strongyloides und Ancylostoma. II. Mitteilung. [**Behaviour of Infective Larvae of S. and A. in Regard to Taxis.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Nov. 17. Vol. 126. No. 3/4. pp. 161–180. With 12 figs. [13 refs.]

In October, 1930, Clayton LANE published a paper on the Behaviour of Infective Hookworm Larvae in which he stated that he could find no evidence of rheotaxis (motion against a current) or thermotaxis, or indeed of any kind of taxis or tropism but thigmotaxis (reaction to contact) [see this *Bulletin*, Vol. 28, p. 228]. Fülleborn criticizes LANE's conclusions. LANE said that an animal always enclosed in water as a condition of its life could not be subject to hydrotaxis : Fülleborn contests this. As to thigmotaxis, defined as a directing attraction between the anterior end of the larva and some stable body, which causes the larva to place itself at right angles to the surface of that body, Fülleborn thinks it has not been demonstrated. As to thermotaxis, which LANE was unable to demonstrate, Fülleborn says he has shown it by the microcinematograph. Other contentions and the arguments on which they are based will be considered when Clayton LANE's further contribution to the subject has been published.

A. G. B.

CHANDLER (Asa C.). **Experiments on Resistance of Rats to Superinfection with the Nematode,** *Nippostrongylus muris.*—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 750–782. With 3 charts. [13 refs.]

In view of the importance of resistance to helminthic infection, any possible addition to our meagre knowedge, even if from the white rat, deserves note. No more than human beings were all white rats found to be equal. Some took infection readily, some did not. Diet had no discovered influence unless the animal ceased to thrive, but if that were so the percentage of worms acquired was increased. Some resistance was induced by repeated reinfection. In these days when egg-counts are so widely set on pedestals as sure measures of worm loads, it is interesting to note that inoculation of larvae of *Longistriata* species, which do not mature in white rats, reduced egg output of *N. muris* to one-tenth. Resistance showed itself in interference with reproduction, in stunting, and in failure to reach adult life, in failure to attain establishment in the intestine, and in expulsion of worms. *C. L.*

NAGATY (H. F.). **The Genus** *Trichostrongylus* **Looss, 1905.**—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 457–518. With 77 figs. [66 refs.]

A critical illustrated study of *Trichostrongylus* species. So far as medical parasitology is concerned there should be noted the placing of *T. delicatus* Hall, 1916, in the synonym of *T. colubriformis* (Giles, 1892), a change in which HALL concurs. *C. L.*

YOSHINO (K.). **Clinical Observations on 25 Cases of** *Strongyloides stercoralis* **in the Yaeyama Archipelago.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1932. Oct. Vol. 31. No. 10 (331). [In Japanese. English summary p. 99.]

During 4 years 25 cases were seen (16 in farmers between 20 and 40 years old) and mostly serious ones; 13 died from complicating diseases particularly bronchitis. Indeed 14 suffered from this, and in 1 of them eggs and rhabditiform larvae, and in two more filariform larvae, were found in the sputum. For this reason they are considered as probably ascribable to auto-infection [but it does not seem reasonable to ascribe the presence of eggs and rhabditiform larvae in the sputum to any other cause than nemidiae parasitizing the air passages.] *C. L.*

KREIS (Hans A.). **Studies on the Genus** *Strongyloides* **(Nematodes).**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 450–491. With 42 figs. [35 refs.]

The helminthic material is grouped into 2 morphological species: *S. stercoralis* in man and dog and *S. simiae* in *Ateles* and *Pithecus*. In the first and second rhabditiform larvae of the indirect cycle and in the rhabditiform sex generation the oesophagus shows three structures described as spears, those in the dog being much smaller than in the monkey; they are not present in the parasitic female nor in the filariform larva. "In describing *Oxyuronema* I stated that this spear-apparatus has on the one hand the function of boring into the wall of the intestine and, on the other, of transferring the toxins of the esophageal glands into the vessels of the host." [It will be noted however, that, as Kreis points out, they are absent just in those forms which presumably need them for penetration or food. Moreover the figures show that they lie in the second and not the first part of the oesophagus; transverse sections, if made, would presumably show whether they functioned apart from the tripartite cuticular oesophageal lining of which they seem to be part.]

A parasitic male, it is claimed, is present. It is described, closely resembles the free-living male, and the circumstances of the finding are as follows :—

> " The strain of *Strongyloides* in man, as well as in the dog, which I had for examination, contained only individuals of the direct life-cycle, *i.e.*, without a " free-living " generation. I found in both cases a male, which must be taken to be the parasitic male. In man I found on one occasion two males in a sample. One of these males was in the molting stage. The second time a single male appeared in another sample somewhat later. On the day when the specimen was obtained the first sample contained filariform larvae, while the second sample showed rhabditiform larvae. In the material, which I got from a dog, I found one living male besides rhabditiform and filariform larvae."

It seems nowhere stated how fresh the faecal samples were and doubtless the matter will be checked by search within the gut of dogs killed for the purpose.

The indirect cycle of development may be divided into 2 categories :— " *a.* The pure indirect cycle, *i.e.*, without a development of the filariform larva from the first rhabditiform larva. *b.* The modified indirect cycle, *i.e.*, the development of the filariform larva from the first rhabditiform larva (probably a mixed strain). The parasitic female of the indirect type is probably parthenogenetic." *C. L.*

McCoy (O. R.). **Experimental Trichiniasis Infections in Monkeys.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Oct. Vol. 30. No. 1. pp. 85–86.

Experimental trichinosis, the first experiments believed to have been carried out on monkeys, involved *Cebus capucinus, Ateles dariensis, A. geoffroyi, Alouatta palliata palliata, A. palliata inconsonans, Leontocebus geoffroyi, Saimiri örstedii* and *Aotus zonalis*. Infection was by counted numbers of larvae given by stomach tube. Doses of 5 larvae or more per gram of body weight were invariably fatal. Many intestinal adult worms persisted 4 to 6 weeks after infection. Each larva administered produced 396 to 1,108 (average 698) larvae in muscles. Rats developed a very definite immunity to reinfection ; 12 monkeys that recovered did not always do so. *C. L.*

Fidel Fernandez (Martinez). Un caso de diarrea por tricocefalos. [**Trichuris Diarrhoea.**]—*Medicina Países Cálidos.* Madrid. 1932. Nov. Vol. 5. No. 6. pp. 507–509.

The patient was an adult who suffered for three years with intractable diarrhoea for which no cause could be assigned. The forms of treatment and list of drugs tried are given and he appears to have suffered much of many physicians.

The faeces having been found to contain ova of *Trichuris trichiura* in considerable numbers, thymol 2 gm. in four cachets was given on alternate days to the patient fasting, one cachet every half-hour, followed by a laxative 2 hours after the last dose. Eight days later the diarrhoea had cleared but ova were still being passed. The treatment was therefore repeated after a week's interval. The symptoms disappeared entirely and subsequent examinations failed to discover any ova. *H. H. S.*

i. EPSTEIN (Sch. I.) & FJODOROWA (T. W.). Zur Epidemiologie der Enterobiose. [**Epidemiology of Enterobiosis.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1931. Vol. 10. No. 4. pp. 365–368. [10 refs.] [In Russian. German summary p. 368.]

ii. OLEINIKOW (S. W.). Zur Revision der Frage ueber die Invasionswege des *Enterobius vermicularis.* [**Channel of Invasion of E.** *vermicularis.*] — *Ibid.* pp. 369–379. [In Russian. German summary pp. 379–380.]

i. Nose, mouth and throat were swabbed with glycerine and water, and parts of the skin were washed in warm water, for recovery of eggs of *E. vermicularis* in 23 persons. The degree of bodily uncleanliness of the selected 23 is unstated. In the navel and groin, eggs were present in 69·5 per cent., in the axilla and hip 54·1, and in the vulva and folds of the abdomen 26; one person shed 450 eggs from the skin in 24 hours. The nose, mouth and throat were particularly infected. The greatest haul of adult worms from one person was 12,123.

ii. The eggs are rarely found in the palm of the hand, and, apart from finger sucking and nail biting, infection is believed to be in the main air borne. *C. L.*

HICKS (E. P.). **The Transmission of** *Wuchereria bancrofti* **in Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1932. Oct. 29. Vol. 26. No. 3. pp. 407–422. [25 refs.]

The author's summary is as follows:—

"1. Human infections with *W. bancrofti* are common in Freetown.

"2. Larval nematodes, presumed to be *W. bancrofti*, have often been found in dissections of wild *Anopheles* in West Africa.

"3. To determine the vectors of *W. bancrofti* in Freetown, laboratory-bred mosquitoes were fed on patients known to harbour *Mf. bancrofti* in the blood, and were dissected after a suitable interval.

"4. *A. costalis* and *A. funestus* both allowed complete development of the larvae. As they are also found infected in nature they must be regarded as important carriers.

"5. *A. rhodesiensis* allowed complete development. But as there is no record of its infection in nature and its biting habits are uncertain, it is not possible to decide its importance in transmitting filariasis under natural conditions.

"6. *A. squamosus* allowed complete development. It has been found infected in nature, but is an uncommon mosquito in Sierra Leone, and therefore must be considered unimportant as a host.

"7. *S. fasciata.* Of thirty-nine specimens which fed on blood containing *Mf. bancrofti* and which survived to the fourteenth day after the meal, only one developed a proboscis infection. This must be considered exceptional, as many of this species have previously been fed experimentally without allowing complete development of the larvae, and as dissections of wild mosquitoes have not shown proboscis infections. *S. fasciata* is not a vector of *W. bancrofti.*

"8. *C. nebulòsus* appears to be unwilling to bite man. It can therefore be disregarded as a vector.

"9. Mature larvae dissected from experimental *A. costalis* and *A. funestus*, and those from wild mosquitoes of these species were indistinguishable from each other, and conformed to the usual description of the mature larva of *W. bancrofti.*" *C. L.*

RAO (S. Sundar) & IYENGAR (M. O. T.). **Experimental Infection of Some Indian Mosquitoes with** *Wuchereria* (*Filaria*) *bancrofti*.—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 25–34.

Experimental infections were produced with the results shown in the Table. Natural infections were observed in *A. ludlowi*, *A.* *nensis* and *C. fatigans*.

C.

Serial number.	Species of mosquito.	Number of specimens examined.	Number found with filariae.	Number of filariae found in one specimen.			Time taken for development of mature larva.
				Maximum.	Minimum.	Average.	
1	*Anopheles hyrcanus* var. *nigerrimus*	27	15	32	1	6·7	12 days
2	*Anopheles barbirostris*	10	4	4	3	3·5	15 days
3	*Anopheles subpictus*—						
	(*a*) Salt-water race	34	26	20	5	8·5	11 days
	(*b*) Fresh-water race	29	21	15	1	5·1	
4	*Anopheles ludlowi* var. *sundaica*	41	28	18	1	7·0	10 days
5	*Anopheles stephensi*	39	36	30	2	12·2	10 days
6	*Anopheles fuliginosus*	43	30	12	1	4·8	10 days
7	*Anopheles pseudojamesi*	15	6	5	1	2·5	
8	*Anopheles varuna*	19	16	18	2	6·5	
9	*Anopheles pallidus*	42	28	55	1	14·9	11 days
10	*Anopheles philippinensis*	3	3	23	21	22·3	
11	*Culex fatigans* ...	212	152	20	2	7·2	11 days
12	*Culex vishnui* ...	4	1	2	—	2·0	
13	*Aëdes* (*Stegomyia*) *aegypti*	50	3	4	2	2·7	Not likely to mature
14	*Aëdes* (*Stegomyia*) *vittatus*	27	0	—	—	—	
15	*Armigeres obturbans*	98	0	—	—	—	
16	*Taeniorhynchus* (*Mansonioides*) *annulifera*	6	0	—	—	—	

IYENGAR (M. O. T.). **Filariasis in North Travancore.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 671–672.

A preliminary note states that in the coastal taluks of Shertalai and Ambalapuzha there exists a filarial infection different from that in any part of India, the nocturnal microfilaria resembling that of *Mf. malayi*. In other parts of Travancore *W. bancrofti* prevails. This atypical filaria did not develop in 800 experimental *Culex fatigans*, but readily did so in *Mansonia annulifera*. In the latter natural infection was found in 26 per cent. of over 900 specimens. [Regarding the claim that the infection occurs nowhere else in India, see this *Bulletin*, KORKE, Vol. 27, p. 987 and (Dutch Indies) BRUG, Vol. 29, p. 76.] C. L.

KORKE (Vishnu T.). **Observations on Filariasis in Some Areas in British India. Part VIII.**—*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 335–339. [14 refs.]

" 1. Examination of the blood of one thousand persons taken at night between 7 and 10 p.m. failed to give any evidence of the incidence of filariasis in the Punjab.

" 2. A comparison of conditions in different parts of Bihar and Orissa and the observations now recorded in the Punjab suggests that there may be some correlation between low altitude of a land and associated rice cultivation, and the occurrence of endemic filariasis." *C. L.*

GIGLIOLI (George). **A Contribution to the Study of the Etiology of the Disease Syndrome in** *Wuchereria bancrofti* **Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. pp. 379–382.

The question of the filarial or bacterial causation of the acute inflam. matory manifestations associated with filarial infection is considered- In British Guiana patients with filariasis constantly apply for vaccine treatment. Giglioli has made numerous attempts to prepare autogenous vaccines for a like use. He has never obtained positive cultures from serum drawn by puncture from the inflamed tissues of uncomplicated typical filarial lymphangitis and lympho-adenitis when these have no progressed to suppuration ; and this is the case both in elephantiasic and non-elephantiasic subjects. In some cases in which suppuration occurred, pus smears proved negative and cultures remained sterile. Being at that time engaged on the study of fixation abscesses, it occurred to Giglioli that if these inflammatory attacks were due to a hidden streptococcus, this was likely to be made evident, if a fixation abscess were produced deep in an acutely lymphangitic tissue. A case is described in which such an abscess was produced by turpentine injection. Its contents were negative to Gram staining and to culture on agar, blood agar, glucose broth and hydrocele broth. "The negative result of this experiment definitely corroborates O'Connor's thesis : the presence of pyogenic organisms in filarial disease appears to have only the significance of a secondary infection."

C. L.

GRACE (A. W.), GRACE (Feiga Berman) & WARREN (Shields). **The Parallel Incidence of** *Filaria bancrofti* **and the β-Haemolytic Streptococcus in Certain Tropical Countries.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 493–508. With 3 figs. [10 refs.]

Authors' summary :—

" 1. A cultural examination of one hundred consecutive abscesses in Jamaica shows that only 6 per cent. contain the β-haemolytic streptococcus, the remainder containing the staphylococcus.

" 2. A filarial census of 250 unselected persons together with routine laboratory observations over many years reveals that while *Filaria bancrofti* is occasionally introduced it does not spread in Jamaica although the requisite mosquito vector abounds in the island.

" 3. There is, thus, in Jamaica a parallel low incidence of the β-haemolytic streptococcus and of *Filaria bancrofti* comparable to the parallel high incidence of these agents in British Guiana and in St. Kitts.

"4. Lymphangitis and elephantiasis are both very rare in Jamaica.

"5. Histological, clinical and bacteriological evidence from a case of elephantiasis in Jamaica appears to support the hypothesis that elephantiasis in the Caribbean tropics is associated with the presence of many minute foci of the β-haemolytic streptococcus in the corium of the affected part.

"6. Intramuscular abscesses, whose relation to *Filaria bancrofti* is still in dispute, are practically unknown in Jamaica." *C. L.*

FROES (H. P.). Microfilaires vivantes dans le liquide séro-fibrineux d'un épanchement péritonéal, chez un ancien paludéen parasité par *Wuchereria bancrofti.*—*Ann. Parasit. Humaine et Comparée.* 1933. Jan. 1. Vol. 11. No. 1. pp. 20–21.

——. **Presence of Microfilariae in the Ascitic Sero-Fibrinous Effusion of a Patient Infested with** *Wuchereria bancrofti.* **(Preliminary Report.)**—*Jl. Trop. Med. & Hyg.* 1933. Jan. 2. Vol. 36. No. 1. p. 6.

In a patient seen at Bahia infected with *P. falciparum*, *S. stercoralis* and hookworms, and having *Mf. bancrofti* with no periodicity in the blood as established by two-hourly tests, and an ascites, Froes drew off the ascitic fluid on two occasions hoping to find strongyloides larvae but found instead living microfilariae.

"This is apparently the first time that microfilariae have been detected in a non-chylous and non-haemorrhagic peritoneal effusion, the diagnosis being made while the patient is still alive. It may be that the embryos were attracted by the liquid, as they were circulating in blood or lymphatic vessels in the vicinity of the ascitic effusion. It is not easy to explain the absence of periodicity of the microfilariae in the blood of this patient."

C. L.

JURGENS (A. L.). De overbrenging van Filaria malayi in de onderafdeeling Mamoedjoe. [**The Transmission of** *Filaria malayi* **in the District of Mamoedjoe (W. C. Celebes).**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. July 19. Vol. 72. No. 15. pp. 953–959.

The author's experiments showed *A. barbirostris* to be a good transmitter of the filaria, the artificial infection index being 83 per cent., the natural index 8·9. In both instances the larvae were found in the proboscis. This fairly high infection rate of *A. barbirostris* may account for the density of the infection among the village population (37 per cent.) notwithstanding the comparative scarcity of the mosquito. *Taeniorhynchus annulipes*, already known as a possible vector, was present in still smaller numbers. The possibility is left open of *A. punctulatus* being a vector too. An Aëdes species (not identified) could not be artificially infected. *W. J. Bais.*

KNABE (K.). Beitrag zur Dauer von Filarieninfektionen. [**The Duration of Filarial Infections.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Sept. Vol. 36. No. 9. pp. 496–500. [19 refs.]

Two cases are described. In the first, microfilariae were never found. The second infection was with *L. loa* and *A. perstans* acquired in the Cameroons and persisting in Germany from 1915 to 1930. *C. L.*

LEGER (Marcel) & QUEINNEC (P.). Quelques mots sur un traitement de la filariose *Loa.* **[Treatment of Loa Infection.]**—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 690–693.

A case is reported with symptoms of loa infection for 6 years, from which, for the last 4 months, there had been no respite. With intramuscular injections by synthol, 15 in all, they disappeared. Microfilariae, however, did not ; they became very rare before injections, but rose to as many as 10 in a drop of blood some hours after them. Synthol is a 33 per cent. alcoholic solution of trichloraldehyde 8 per cent., menthol 2·5, orthodioxybenzene 2·4, and other unmentioned substances. The man's weight fell during the course of injections from 93 to 87 kgm. In discussion BROQUET reported two cases, husband and wife, treated with a quinine-iron-arsenic preparation, one of whom described the remedy as marvellous, the other being less pleased with it.

C. L.

MOORTHY (V. N.). **An Epidemiological and Experimental Study of Dracontiasis in Chitaldrug District.**—*Indian Med. Gaz.* 1932. Sept. Vol. 67. No. 9. pp. 498–504. With 2 figs.

The disability induced in Chitaldrug, Mysore, by dracontiasis is estimated at Rs.40,000 annually. Step-wells are its source but not all of them, since the same village may contain two, one for high caste Hindus and one for others, and of two instances cited high caste Hindus only were infected in one village and other castes only in the other. Draw-wells when provided may not be used, thus :—" In one place I was surprised to get a reply from an individual that the water in the step-well was so sweet and pleasant to drink that he preferred to drink this infected water and suffer from dracontiasis once a year, rather than drink the brackish draw-well water which he considered a continuous misery." The cyclops " catches the larvae by means of its first pair of legs and with the help of its anterior and posterior pairs of antennae, pushes the larvae gradually into its stomach through the mouth," In a village heavily infected with guineaworm a breach in an embankment let *Barbus* fish into its step-well in which they have since lived ; the worm infection has since almost disappeared. *Barbus puckelli* is a most voracious feeder on cyclops. Effects of hydrochloric acid on cyclops, and on guineaworm larvae within it, are noted, and it seems to be considered that those of gastric juice will be the same. LEIPER's observation is repeated that a heavy infection shortens the life of cyclops. Of 1,363 sufferers from dracontiasis in one year, 1,144 had previously been infected. *C. L.*

MOORTHY (V. N.). **Treatment and Prophylaxis of Dracontiasis.**—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. pp. 617–619.

The author gives the following summary :—

" 1. For purposes of experimental observation a guinea-worm-infected step-well at Kelgote was treated first with copper sulphate and later twice with perchloron at intervals of 3 days. This measure rendered the well quite free from adult cyclops for a period of about a month. In addition, fish belonging to species *Barbus puckelli* were introduced into this step-well so that these might feed on any cyclops that are likely to be formed from the eggs on which the chemicals used had little or no effect. It is to be seen whether this measure will reduce the number of cyclops in the well permanently and hence also guinea-worm infection in the place. Laboratory experiments show however that this species of fish feed voraciously not only on cyclops but also on guinea-worm larvae.

" 2. Weak solutions of asafoetida and an aqueous extract of bamboo leaves have a definitely lethal action on cyclops This property can possibly be made use of in advocating any household prophylactic measures in the guinea-worm infected villages

" 3 The aqueous extract and also the juice expressed from the young bamboo shoots have remarkable 'cyclopedocidal,' larvicidal, and insecticidal properties " *C L.*

CHACÓN (A Lachner) The Clinical Symptomatology of Ankylostomiasis — *Twentieth Ann Rep Med Dept United Fruit Company, Boston, Mass* 1931 pp 176–178

FERNÁNDEZ (Julio G), CARRI (Miguel A) & CAPURRO (Jorge D) Obstrucción intestinal por ascárides —*Semana Méd* 1932 Nov 3 Vol 39 No 44 (2025) pp 1274–1276

FRÓES (Heitor P) Indentificação de microfilarias vivas em liquido ascitico serofibrinoso, proveniente de um malariento parasitado pela " Wuchereria bancrofti," e em quem se não verifica a periodicidade habitual das microfilarias no sangue peripherico —*Brasil-Medico* 1932 Oct 8 Vol 46 No 41 pp 860–861

KAWANISHI (K) Experimental Studies on the Entrance of Bacteria Incidental to Percutaneous Infection of the Human Body with Hookworm —*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1932 Aug Vol 31. No 8 (329) [In Japanese English summary p 82]

KITAMURA (K) & TAKADA (I) Histopathologische Kenntnisse des Lymphangioendothelioms des Hodens bei Filariakranken —*Japanese Jl Dermat & Urol* 1932 Sept Vol 32 No 9 [In Japanese pp 818–824 With 3 figs [14 refs] German summary p 110]

NARITOMI (Chiko) Ein weiterer Fall von *Sparganum mansoni* auf ophthalmologischem Gebiet —*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* — 1932 Aug Vol 31 No 8 (329). [In Japanese German summary p 83]

LEPROSY.

DUBOIS (A.). La prophylaxie de la lèpre au Congo. **[Leprosy in Belgian Congo.]**—*Bruxelles-Méd.* 1932. Oct. 2. Vol. 12. No. 49. pp. 1370–1377.

——. La lèpre dans la région de Wamba-Pawa (Uele-Nepoko).—Extract from *Mémoires Inst. Royal Colonial Belge* (Section Sci. nat. et méd.). 1932. Vol. 1. No 2. 87 pp. (8vo). [Refs. in footnotes.]

——. La lèpre dans la région de Pawa-Wamba.—Reprinted from *Bull. Inst. Roy. Colonial Belge.* 1931. Vol. 2. No. 1. pp. 173–179.

The author visited the North-east Congo to investigate leprosy; the rainfall is heavy and local surveys have revealed that from 4 to 15 per cent. of the population shows signs of leprosy, most often in the form of pigmented macules and running a slow course. He lays stress on the diagnostic value of superficial anaesthesia as described by MUIR, and prolonged search reveals lepra bacilli in about 50 per cent. As regards prophylaxis rigid isolation is impracticable, for with an admitted incidence in the Congo of about 2 per cent. there must be 200,000 lepers. He advises that the highly infectious nodular cases, which form a minority, should be accommodated in special areas and treated with chaulmoogra preparations, although he is not satisfied that they are very efficient, owing in part to the frequent presence in the patients of debilitation due to malarial, worm and syphilitic infections. He advocates leper villages for nodular and mixed infectious cases with land to cultivate and a dispensary for treatment, together with a central laboratory and hospital with a medical man in charge devoting all his time to leprosy.

He records the results of a large number of tuberculin tests from which he concludes that only lepers with tubercle infection give positive reactions. He carried out sedimentation tests also and considers that they give some prognostic indications. Cutaneous reactions with leprolin only partially confirmed the findings of BARGEHR, since the author found both lepers and those living in contact with them gave negative results. *L. Rogers.*

LEPROSY IN INDIA. 1932. Oct. Vol. 4. No. 4. pp. 169–223. With 3 figs. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

This number includes a note by L. LOWE on leprosy and sex which he thinks requires further investigation. In 4,000 children of school age in Travancore both sexes showed 1 per cent. with leprosy. Census figures show a preponderance of males, partly due to the seclusion of females, but among a labour population B. N. GHOSH in an industrial area found more females infected. The provisional conclusions come to are that male lepers preponderate over female at all ages due to less exposure of the latter to infection where they live secluded lives.

J. LOWE also reports on how to prevent pain and other troubles from the injection of hydnocarpus oil and ethyl esters. He lays stress on obtaining pure fresh oil, preferably in June and July, and storing it in well stoppered bottles to avoid oxidation, and sterilizing at 120°C. for half an hour after adding 4 per cent. creosote. The method of making esters is also given.

Leprosy surveys revealed 7·7 per mille in Cuttack town in Orissa and 2·3 per cent. in neighbouring villages, 4 to 5 times as many as shown in the census returns. The Cuttack leper institution has 250 inmates and many early cases attend a clinic. In a hilly area of Kangra in the Punjab 2·4 per mille were found against a census figure of 0·62, and in the Burdwan district of Bengal the figure was 4 per mille, or more than 3 times the official figure: all bearing out MUIR's earlier surveys. *L. R.*

MUIR (Ernest) & SANTRA (Isaac). **Sample Surveys of Leprosy in India.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 421–434. With 1 map.

This paper summarizes the surveys in various parts of India to ascertain the real prevalence of leprosy; a number of these have been dealt with in this *Bulletin*. In a total of 4,560 villages with a population of 2,435,610 persons 16,499 lepers were found or 0·7 per cent., and in 61 districts where the figures of previous census enumerations were available the cases found by the survey parties were four and a quarter times as many. As the 1921 census showed 102,513 lepers in British India the authors conclude that the surveys confirm Muir's estimation of between half to one million cases in all India including many early uninfective lepers. The census figures show the highest incidence in Burma, Assam, East Bengal, the sub-Himalayan and hill districts, Orissa and North Madras; and the lowest mainly in the Punjab, S. United Provinces, desert areas and Mysore. Aboriginals suffer little, but semi-aboriginals in contact with civilized conditions suffer much, especially labour forces. Markets and pilgrimages spread the disease, and debilitating diseases and deficient diets predispose to leprosy. *L. R.*

AUSTIN (C. J.). **Report on Central Leper Hospital, Makogai.**—*Fiji Ann. Med. & Health Rep. for Year 1931.* pp. 36–42. With 6 figs. & 1 diagram.

During 1931 there were 119 admissions, 2 discharged free from the disease and 16 on parole; 39 died, mostly from exhaustion or tuberculosis, and at the end of the year the numbers remaining had risen from 433 to 494, the highest on record. Over half the patients were treated for hookworm infection; 62·2 per cent. were positive bacteriologically. The percentage of improvement was from 70 to 92 per cent. in nerve and 19 to 61 per cent. in skin cases. The women did as well as the men. A storm did some damage, but the patients grew £600 worth of vegetables which were bought by the hospital. *L. R.*

KUPFFER (A.). Ueber die Verbreitungsweise der Lepra. Beobachtungen aus Estland. [**Method of Spread of Leprosy in Estonia.**] —*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Vol. 36. No. 3. pp. 141–186 (1–46). With 1 map.

The author has been in medical charge of the leprosarium at Kuda, in Estonia, for the last ten years' and he has studied the spread of the disease in an isolated area, with 424 recorded cases of leprosy since 1828, when the disease is said to have been imported by Cossacks! Later, cases were observed at the Dorpat clinic. In 1896 the leprosarium was opened in Kuda when there were 63 lepers registered in the country, in 1900 115 and in 1901 142 cases. An inquiry and a search for cases led to an increase in the registered cases to 270 in 1906, 396 in 1916 and 424 by 1921 of which 283 had died and 143 were still living; the local distribution is given in detail. There are a number of foci, some of which tend to spread the disease more than others, but in the decade 1906–1916 there was some decrease which has most likely continued to the present time because both the number of deaths from leprosy and the number of new cases is smaller. *L. R.*

LEPROSY REVIEW. 1932. Oct. Vol. 3. No. 4. pp. 136–179. With 8 figs. & 1 map on 6 plates; 1933. Jan. Vol. 4. No. 1. pp. 1–45. With 12 figs. (10 on 6 plates). Quarterly Publication of the British Empire Leprosy Relief Association, 29, Dorset Square, London, N.W. 1.

The October issue includes an account of a trial of alepol tabloids in the Federated Malay States; one to three were given orally twice a week with a draught of glucose and sodium bicarbonate to lessen nausea, with or without intradermal injections of iodized esters; the treatment was usually well borne and the impression gained that the combination with intradermal injections was very useful and deserving of further trial.

P. H. J. LAMPE gives an interesting description of the adoption of modern methods of dealing with leprosy in Surinam (Dutch Guiana) under an ordinance of 1929 with a medical board in charge of the measures. These include medical treatment of non-segregated lepers at dispensaries, which is put in the forefront in place of " compulsory segregation, which was to be considered as a punishment." Regular examination of all school children " has proved to be the most efficient way of finding out slight or early cases of leprosy," and 123 out of 8,800 were declared infected by the board, 44 highly so. An open-air " dispensary school " has been provided for 185 children close to the treatment dispensary with 249 patients with about 85 per cent. attendance rate. Cases not highly infectious can be treated at home under the board's control. The Surinam Leprosy Relief Association among other things supplies food for the school children. As the result of these measures the numbers in the asylums has increased from 407 in 1929 to 482 in 1931 for a population of 134,000, the number of children especially having risen and the new measures are considered to be most promising. [Now that both British and Dutch Guiana have adopted modern leprosy methods, when will the British West Indian Islands, with small areas and populations most suitable for stamping out the disease, follow suit?]

Other articles deal briefly with leprosy in the British Solomon Islands with 42 known cases, the Ukuguru district of East Tanganyika, where the true incidence is placed at 25 per mille against an official estimate of only 2·8, and the Katanga area of Belgian Congo where there are said to be at least 1,000 cases with 216 in a colony and 500 registered at a dispensary.

In the January number F. G. ROSE records five years' leprosy work in British Guiana on modern lines since 1926. This is based on measures to induce patients to seek early treatment by propaganda and a change of the law to permit closed uninfective cases to be treated at out-patient clinics, the isolation of open ones as long as they remain infective, long following up of discharged cases and the removal of new-born children from infected parents. Special attention is paid to examinations of the families of infected persons. These changes led to an increase of the known cases to 477 by the end of 1931 owing to increasing willingness to undergo treatment. Weight charts are of great value in enabling the dose to be increased as long as weight is being gained. The results of intravenous alepol and oil or esters intradermally or intramuscularly in 491 cases, including some only treated a few months, showed 128 with disease arrested, 132 quiescent, 101 subsiding, or a total of 361 (73·5 per cent.) improved, while 18 were stationary, 17 worse and 95 (19·3 per cent.) had died. In early cases 86·6 per cent. had improved, and 9·3 per cent. died, but of 116 control untreated cases only 33·6 per cent. improved and 63·8 per cent. died. Of bacteriologically positive cases 41·2 per cent. became negative after treatment. On the important question of recurrence 14 arrested cases had relapsed but at the time of writing only 6 have failed to recover, so there were only 4·7 per cent. of lasting relapses in 128 arrested cases with complete follow up and re-examination monthly after discharge. Separate buildings and a school are being erected for young children. Only 3 discharged patients were unable to earn their living. Hydnocarpus trees have been grown. These results are very encouraging.

Other articles deal with leprosy in Southern Rhodesia by B. MOISER; the Itu Leprosy Colony in S. Nigeria with 1,012 cases by its founder J. A. MACDONALD; a trial of the gold preparation Solganol in eye cases with improvement in six out of eleven cases; and a note by P. H. J. LAMPE recording his experience in Surinam that many early symptoms in children remain the same or diminish spontaneously.

L. R.

i. MANALANG (C.). **Epidemiology of Leprosy.**—*Monthly Bull. Philippine Health Serv.* 1932. Jan. Vol. 12. No. 1. pp. 5–6; Sept. No. 9. pp. 452–465. [35 refs.]

——. **Transmission of Leprosy. II.**—*Ibid.* 1932. Aug. Vol. 12. No. 8. pp. 363–370. [13 refs.]

ii. ——. **Leprosy—Etiology, Transmission and the Causes of Slow Progress in its Prevention.**—*Ibid.* pp. 378–386. [12 refs.]

iii. PHILIPPINE HEALTH SERVICE. **Transactions of the Open Meeting of the Leprosy Advisory Board held in Manila on October 26 and 27, 1932.**—129 pp. 1932. Manila: Bureau of Printing.

i. In this series of papers the author advances the hypothesis that infections with leprosy only take place in infancy or the first three years of life and that all cases of infection in adults may be dismissed as furnishing no evidence to the contrary because "there has been no record of thorough physical examination to eliminate the presence of early or latent and usually unrecognized lesions before the supposed exposure took place. Therefore, all the evidence to the effect that leprosy is contracted by the adult are fundamentally incomplete, and consequently, unscientific."

ii. The writings of various leprologists are cited, from a consideration of which Manalang concludes that "a non-acid-fast or virus stage of the life cycle of *M. leprae* is probably the etiology of the disease, the acid-fast bacillus stage is inactive." Infants are infected by this virus through the skin, but adults are immune.

iii. In a further paper published in the Transactions of the open meeting of the Leprosy Advisory Board held in Manila on October 26 and 27 (1932) Manalang discusses the pathological work of WADE, HENDERSON and others and his own microscopical work (see below) and concludes that early bacteriologically negative cases of leprosy and the tuberculoid form with very scanty bacilli must be caused by " a virus stage of *M. leprae*, and not by the bacilli." He therefore argues that the search for acid-fast bacilli is not a satisfactory criterion for isolating cases, and that hydnocarpus treatment " is only effective in removing macrophages and inert bacilli, but has no effect on the active virus of leprosy as indicated by the persistence or reappearance of the basic tissue reaction."

Most of the other papers read at the above-mentioned meeting were also published elsewhere and are dealt with below. A note by M. CARREON on a survey of fifteen families of leper children shows that in twelve, or 80 per cent., either the father or the mother was a leper and nine other children showed signs of the disease, so he advocates examinations of the families and close relatives of lepers as proposed by ROGERS.

An interesting and somewhat lively discussion on segregation in the Philippines forms the most important part of the Transactions of this meeting.

Several of the medical men present held that compulsory segregation had failed to fulfil the hopes of its originators as 1,000 new cases still appeared yearly, but nearly all considered that it should be maintained as now modified by the addition of treatment centres near towns and clinics, at which 80 per cent. of the cases were voluntary. W. H. WADE supported segregation and stated that 60 per cent. of the admissions to the Culion settlement were now also voluntary and that they came " for the treatment." Dr. PADUA pointed out that if Manalang's hypothesis was correct " we should segregate the children contacts as well as paroled lepers who are, according to the theory of Dr. Manalang, virus carriers," and he asked, what island or colony would be able to contain them all ? J. G. TOLENTINO opened this discussion with a paper on " Why the present system of segregation fails to eradicate leprosy," and he pointed to the fact that of the 600 new cases admitted to a treatment centre in three years only 36·2 per cent. came in the first year of the disease ; he advocated further mitigation of the methods to attract earlier cases, and systematic surveys of the population to find them. Dr. RODRIGUEZ held that " In the Philippines segregation has not been given a really fair trial, because up to a few years ago the people themselves were against segregation." With treatment in hospitals and dispensaries in the provinces its benefits are now beginning to be appreciated. Dr. PANIS agreed that " the modification of the policy of compulsory segregation is now beginning to bear fruit."

No definite conclusions appear to have been arrived at. *L. R.*

LARA (C. B.). **The Parole and Follow-Up of Quiescent Cases of Leprosy and Associated Problems.**—*Jl. Philippine Islands Med. Assoc.* 1932. Oct. Vol. 12. No. 10. pp. 476–485. [20 refs.]

From 1906 to 1921 only 47 cases were paroled from the great Culion settlement, but since the improved treatment was largely used from 1922 to 1931 2,019 were paroled, including a number of earlier cases treated since the regional treatment stations and skin clinics were opened in 1929, but an active follow-up system has only been carried out since 1930. Released cases are supposed to report locally for examination once a week for two years and then every three to six months for four years, but this could not be enforced in many cases. The author analysed the records of 896 cases considered at some time to have been quiescent between 1922 and 1927, and found that among those quiescent for one year or less 28·8 per cent. had relapsed, against 11·2 per cent. of those who had been quiescent for over one year and only 5 per cent. of those quiescent for over two years. Figures elsewhere are also quoted. In Manila and neighbourhood among those released since 1922 more than 46 per cent. of those traced fairly regularly have returned bacteriologically positive, and the rate was nearly twice as high among those released after a quiescent period of ½ to 2 years over those quiescent over two years. It has therefore been suggested that the earlier release should be stopped and the longer period of quiescence before parole reverted to, but on the other hand it is urged that the policy of earlier release has been very successful in increasing public co-operation, " especially in inducing early cases to present themselves for treatment." *L. R.*

LARA (C. B.). **Observations on Readmitted Cases, with Special Reference to Predisposing Causes of Relapse in Leprosy : I. Factors Already Operating Prior to Parole. II. Factors Operating Subsequent to Parole.**—*Jl. Philippine Islands Med. Assoc.* 1932. Nov. Vol. 12. No. 11. pp. 537–551 ; 552–558. [Refs. in footnotes.]

This is an important study of the frequency of relapses in cases of leprosy released from Culion as far as it has been possible to follow them up. The author concludes : (1) Follow up surveys show a high incidence of relapses partly due to treatment of the released cases not having been regularly carried out.

(2) Of 116 readmitted cases of relapse or " interruption " 52·6 per cent. returned still quiescent, but 47·4 per cent. were active and bacteriologically positive. Of 98 cases readmitted still quiescent 87, or 88·8 per cent., have not shown any sign of relapse, while 11 subsequently relapsed after one to nine years quiescence, but 7 of them had again become quiescent.

(3) The incidence of relapse among readmitted quiescent cases is less than of paroled cases living outside under less favourable conditions.

(4) Inquiry showed that females were slightly more predisposed to relapse than males, especially those between 12 to 20 and 30 to 45 years of age. Cases of more than five years duration relapsed more than earlier cases, but cutaneous and nerve cases showed about equal tendency to relapse. Mild cases treated for a shorter time relapsed more than severe cases treated for longer, and there were also more among those released after a negative period of less than one year than those longer negative before release. The occurrence of lepra reactions during treatment showed no relation to relapse.

From the study of factors operating subsequently to parole it appeared that there were a few more readmitted for relapse among those who had received special treatment during parole, but on the other hand only one-eighth as many of the quiescent cases treated during parole relapsed as of those who received no treatment, and among 98 readmitted quiescent cases only 4 relapsed of 54 receiving treatment, against 7 of 44 receiving little or no treatment after readmission, so "the evidence is preponderatingly in favour of the value of continued treatment as a means of decreasing the incidence of relapse." Among other factors associated with relapse the most important were in the order given: sexual excess, especially with pregnancy ensuing in women, adolescence, hard manual work, deficient food and poverty. Tuberculosis is also a more or less potent cause of relapse. *L. R.*

SOULE (Malcolm H.) & McKINLEY (Earl B.). **Further Studies on Experimental Leprosy and Cultivation of** *Mycobacterium leprae*.—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 441–452.

The work already reported on the cultivation of the *Myco. leprae* on media under various tensions of CO_2 and O_2 has been continued and the hormone glycerol agar, with a gaseous environment of 40 per cent. O_2 and 10 per cent. CO_2, has been found most efficacious, while no proliferation has been obtained in any of the air controls; the presence of some oxygen is also necessary to success, so the bacillus is a strict aerobe. In the course of eighteen months a total of sixteen generations has been obtained, but organisms of the ninth to the eleventh serial transfers failed to produce experimental tissue changes in older monkeys than those used in the earlier work. Injections of cultures into guineapigs and mice caused no pathological changes. Serological tests with the cultures failed to give satisfactory results. They were unable to confirm CANTACUZENE's claim to have demonstrated a filterable form of the organism. *L. R.*

PECHKOVSKY (G.) & MALININE (I.). Cultivation des bacilles de la lèpre par le procédé du Prof. G. S. Koulécha. [**Cultivation of Leprosy Bacilli by Koulecha's Method.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1932. Vol. 11. No. 3. pp. 161–167. [In Russian. French summary pp. 167–168.]

PESCHKOWSKY (G. W.) & MALININ (I. M.). Ueber Prof. Kuleschas Methode der Züchtung von Reinkulturen des Leprabazillus.—*Zent. f. Bakt.* I. Abt. Orig. 1932. Oct. 25. Vol. 126. No. 1/2. pp. 137–145. With 3 figs.

The authors describe the method of G. S. Koulecha of culture of the leprosy bacillus by placing fragments of the spleen removed *post mortem* aseptically in broth with 4 per cent. glycerine with a pH 6·8–7·0. After 4 to 5 months the surface of the medium shows a layer containing acid-fast bacilli resembling those of leprosy. A second generation can be obtained on the same medium, but rarely a third. *L. R.*

DE SOUZA-ARAUJO (H. C.). Essais de culture du *Mycobacterium leprae* (*Coccothrix leprae*, Lutz, 1886) par la méthode de Sumiyoshi-Shiga. [**Attempts to cultivate** *Myco. leprae* **by Shiga's Method.**]—*C. R. Soc. Biol.* 1932. Oct. 21. Vol. 111. No. 31. pp. 331–332.

The author used the cultural methods of Sumiyoshi-Shiga for six months with fresh lepromas excised from 12 lepers, but only once obtained colonies on glycerine agar, after 30 to 60 days, of acid-fast bacilli resembling those of Hansen and these ceased to grow after two or three generations. He therefore considers it impossible or very difficult to obtain success by Shiga's method which is much inferior to that of M. Ota [see this *Bulletin*, Vol. 27, p. 339]. *L. R.*

OTA (Masao) & ASAMI (Schuzô). Culture du *Mycobactérium leprae muris*. [**Cultivation of** *Myco. leprae muris*.]—*C. R. Soc. Biol.* 1932. Oct. 21. Vol. 111. No. 31. pp. 287–289.

Doubts have been expressed whether the bacillus of rat leprosy has been cultivated. The examination of 2,157 rats in Japan showed 7 per thousand of *norvegicus* and 10 per thousand of *rattus* infected. They succeeded in getting cultures of acid-fast bacilli from the glands of 11 rats on the media of Petragnani or of Petroff in small colonies appearing in 5 to 110 days. *L. R.*

CANTACUZÈNE (J.) & LONGHIN (S.). Transmission expérimentale de la lèpre humaine au rat blanc. [**Experimental Transmission of Leprosy to the White Rat.**]—*C. R. Acad. Sci.* 1932. Sept. 19. Vol. 195. No. 12. pp. 533–535.

The authors have previously recorded proof of the existence of an ultra-virus of leprosy by inoculating into the peritoneal cavity of rats, after treating the mesentery by the method of Van Deinse, a filtrate of an emulsion of lepromata passed through a Bougie L. The rats get ill and in two or three months Hansen's bacilli are found in large numbers in the mesentery. They now report that they have succeeded in producing regularly in rats a fatal infection with Hansen's bacillus. They commence by inoculating into the peritoneal cavity a mixture of 5 per cent. each of sodium diphosphate and calcium chloride, which rapidly produce adhesion of the mesentery, and one to two days later an unfiltered emulsion of a leproma is inoculated into the peritoneum; a guineapig is also inoculated to exclude the presence of the tubercle bacillus. A chronic disease is thus produced which proves fatal in 5 to 6 months, and *post mortem* the glands all over the body are much enlarged, especially the inguinal and axillary, but with no trace of caseation, and the spleen is two to three times the normal size. Sections of the mesentery, spleen and glands show acid-fast bacilli, but in control animals without the previous treatment of the mesentery the lepra bacilli are completely absorbed in 2 to 3 weeks. The bacilli are often found in masses in cells or granular, and thus resemble that of HANSEN. *L. R.*

LÉPINE (P.) & MARKIANOS (J.). Sur la perméabilité de l'intestin du jeune rat au bacille de la lèpre humaine. [**Permeability of Young Rat's Gut to Leprosy Bacilli.**]—*C. R. Soc. Biol.* 1933. Jan. 13. Vol. 112. No. 1. pp. 19–20.

In this short note the authors report feeding rats free from rat leprosy with a rich emulsion of Hansen's bacillus and examining later for absorption by lymphatics; guineapigs were inoculated to exclude the tubercle bacillus. They found discharge of the bacilli in the stools after 18 hours, and on killing the rats in 5 to 9 days, and examining minutely the lymphatic glands of the intestinal tract, they obtained negative results with adult rats, but in two young ones still being suckled they found acid-fast bacilli after five days and in one of two after nine days. *L. R.*

AMBROGIO (Agostino). Alcune ricerche sulla colloidolabilità dei sieri lebbrosi. Reazioni chimiche, di precipitazione e di flocculazione. Parte prima. Reazioni di Matéfy, Darany, Baum-Schumann, Klausner, Bruck. [**Researches on Colloid Instability of Leprous Serums. Chemical Precipitant and Flocculant Reactions. Ist Part. Matéfy's, Darany's, Baum-Schumann's, Klausner's, Bruck's Reactions.**]—*Pathologica.* 1932. Oct. 15. Vol. 24. No. 492. pp. 721–729. [44 refs.] English summary.

" None of the above reactions is able to bring a real practical contribution to the biological diagnosis of leprosy. Only a few tests (Matefy's, Baum-Schumann's, Darany's) giving often a positive result with leprous serums, might be employed to support the evidence obtained from clinical and bacteriological researches." *L. R.*

RHEE (Y. C.). **The Relation between Positive Serum-Reaction and Lipoid Substances in the Tissues of Lepers.**—*Japanese Jl. Dermat. & Urol.* 1932. Sept. Vol. 32. No. 9. [In Japanese pp. 784–817. [121 refs.] [English summary pp. 101–110.]

The author has found that lipoid substance can be demonstrated histologically in leprous tissues and that there is a close relation between the quantity of lipoid and the frequency of a positive Wassermann reaction in leprous serum, for, regardless of the type of the disease, there was more marked precipitation of lipoid material in all the 10 Wassermann positive cases. In 25 Wassermann negative cases no lipoid precipitation was found in 12 and extremely little in 6 more and only one had fat in the leprous cells, but in four acute early cases there was much fat precipitation. He thinks that in the breaking down of numerous bacilli in the cells an antilipoid substance is formed and enters the blood. *L. R.*

EMERSON (George), ANDERSON (H. H.) & LEAKE (C. D.). **Lipolytic Activity of Rat Tissues in Experimental Leprosy.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Nov. Vol. 30. No. 2. pp. 150–152.

In view of the suggestion of WALKER and SWEENEY that the action of chaulmoogra oil in leprosy might be due to stimulation of non-specific lipolytic activity of the tissues, which would attack the fatty capsule of acid-fast bacilli, the authors have studied the lipolytic activity of leprous tissues in experimental rat leprosy in comparison with that animal's normal tissues. They now report on the effect of the presence of leprosy in the body on the tissue distribution of lipase in comparison with normal animals and find that leprous tissue is significantly and constantly lower in lipolytic activity than other tissues of infected or normal rats, and the presence of late stage large lesions significantly lowers the lipolytic activity of most tissues of the body with the probable exception of the spleen. *L. R.*

MANALANG (C.). **Significance of Pathologic Findings in Biopsy Materials from Lepers. II.**—*Monthly Bull. Philippine Health Serv.* 1932. Mar. Vol. 12. No. 3. pp. 77–79.

In a brief note the author states that he has examined leprous material from 60 additional cases of early lesions in children and he maintains that there is an "invisible ultravirus" stage of the leprosy bacillus which is the cause of the so-called early stage, and that after the disappearance of visible bacilli under treatment it is the ultravirus which causes relapses. He also thinks that bacteriologically negative cases may be infective through the presence of the ultravirus. *L. R.*

CHIYUTO (Sulpicio). **Leprolin Test.**—*Monthly Bull. Philippine Health Serv.* 1932. July. Vol. 12. No. 7. pp. 300–307.
MANALANG (C.). **Significance of Leprolin Reaction in the Natural and Experimental Transmission of Leprosy.**—*Ibid.* pp. 308–310.

The first author used one gram of ground-up leprous nodules boiled in 20 cc. normal saline for 30 to 60 minutes and filtered through 3 to 4 layers of gauze, heated to 60°C. for an hour and 0·5 per cent. of carbolic acid added. Children of leprous parents with early neuromacular signs gave 84 positive and 16 negative leprolin reactions. Healthy children without history of leprosy showed 67 per cent. positive, and 10 healthy adults all gave positives. Negative results in children of both groups may be considered a lack of resistance to leprosy.

The second author states that BARGEHR and MITSUDA advocate leprolin vaccinations to produce immunity among attendants. He considers nodule formation in monkeys after intradermal inoculation with leprous material as a leprolin reaction, and that Chiyuto's findings support the view that leprosy is usually contracted in early infancy, so leprolin might be tried as a prophylactic in the infants of lepers.

L. R.

BADENOCH (Alexander Guthrie) & BYRON (Francis Eric). **The Calcium Content of the Blood Serum in Some Cases of Leprosy.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 253–258. [10 refs.]

The authors report with regard to this much discussed subject that lepra reaction is nearly always associated with a low serum calcium figure and other cases have a rather higher but still subnormal content. Repeated estimations in treated cases showed a rise in the calcium with clinical improvement in non-reaction as well as reaction cases. In a few cases a high calcium content was associated with a more rapid advance of the leprotic process. The calcium content of the diet should be considered. *L. R.*

BRANTS (J.). Komplementbindungsreaktion mit dem Tuberkulose-Antigen von Witebsky, Klingenstein und Kuhn bei Lepra. [**Complement Fixation Reaction with the Tubercle Antigen of W. K. & K.**]—*Dermat. Woch.* 1932. Nov. 19. Vol. 95. No. 47. pp. 1688–1691.

WITEBSKY, KLINGENSTEIN and KUHN have studied different fractions of tubercle bacilli extracts extensively and found that alcoholic tubercle bacilli extracts contain lipoids which give complement fixation with syphilitic as well as in tuberculosis sera, so the author has tested their antigens in leprosy cases including 50 nodular, 4 mixed and 26 nerve cases, the Wassermann test also being carried out. With various syphilitic antigens from 40 to 60 per cent. of nodular cases gave positive results, but only in 1 of 28 nerve cases. The Besredka antigen gave positive results in 25 out of 33 nodular, but weaker and fewer ones in nerve cases. With the antigens of Witebsky *et al*, all the nodular and mixed cases gave positive reactions, which were strong in 46 cases, and of the 26 nerve cases 20 were positive and 5 strongly so, and 6 negative, but one of the latter had been discharged cured and the other five were cases of over 30 years' duration. He therefore recommends that in cases of leprosy with positive Wassermann reactions a complement fixation test with tubercle bacilli antigens should be undertaken by the above method.

L. R.

LAIGRET (Jean). Sensibilité de l'homme lépreux au bacille de la lèpre murine. [**Susceptibility of a Leper to the Rat Leprosy Bacillus.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 290–293.

A nodular leper aged 56 was inoculated with the rat leprosy bacillus in a fresh rat nodule in the lobe of the right ear and evidence was obtained of the multiplication of the organisms in the human tissues.

L. R.

TISSEUIL (J.). Première série d'essais de traitement de la lèpre chez le rat. [**Treatment of Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 969–976.

This is an interesting paper in view of the close similarity of the human and rat leprosy bacilli. Potassium iodide was injected intraperitoneally. With potassium iodide the lesions appeared more slowly but developed more rapidly with rapid decline of the animals. Lipiodol intramuscularly weekly appeared to have a favourable effect as did ethyl ester chaulmoogrates with longer preservation of the general condition of the animals. Molybdate of ammonium intramuscularly had only a slight early retarding effect on the disease. *L. R.*

SARDJITO (M.) & SITANALA (J. B.). Die Dicktropfenmethode zum Nachweis von Leprabazillen im Blut. [**Thick Drop Methods for Demonstration of Lepra Bacilli in Blood.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Dec. 15. Vol. 126. No. 5/6. pp. 427–433. With 6 figs.

Various somewhat complicated methods have been used for examining thick drop blood specimens for lepra bacilli. The authors used Ross's malarial method by treating dried specimens by filtered water and staining by the Ziehl-Neelsen plan, sometimes combined with Gram. They took blood from healthy looking skin after cleansing with ether and alcohol. In 33 untreated cases 25 were positive whereas nasal mucus and ear serum gave 26 and 25 positive, in 19 treated cases the numbers were 15, 12 and 12, and in fellow lodgers who are carriers, of 10 examined the figures were 6, 4 and 1. *L. R.*

LARA (C. B.) & SAMSON (J. G.). **Role of Iodine in Iodized Oil Derivatives used as Antileprotic Drugs: Trial of Plain and Iodized Olive Oil Ethyl Esters.**—*Jl. Philippine Islands Med. Assoc.* 1932. Oct. Vol. 12. No. 10. pp. 485–493.

Iodine has long been added to ethyl esters in the Philippines to lessen the pain on injection and a trial of iodized olive oil with marked improvement has led to further tests as to the value of the iodine by the use of olive oil esters with benzocaine to lessen irritation, with and without the addition of iodine, both used by the intradermal method sometimes supplemented by intramuscular injections. After six months' treatment improvement was found in 57·9 per cent. with the iodized ester as compared with 14·2 per cent. without the iodine, and the results also compared favourably with iodized chaulmoogra ethyl esters. The proportion of iodine did not exceed 0·5 per cent. and of benzocaine 2 per cent. *L. R.*

LE FORESTIER (Roger). Notions médicales actuelles sur la lèpre. Epidémiologie, dépistage clinique et bactério-sérologique, thérapeutique. [**Present Medical Knowledge of Leprosy.**]—*Marseille-Méd.* 1932. July 25 & Sept. 25. Vol. 69 Nos. 21 & 27. pp. 97–120; 377–391. With 5 figs. [Refs. in footnotes.]

This is the commencement of a general discussion of the subject with some notes on the types of leprosy met with in French possessions and illustrations. *L. R.*

COCHRANE (Robert E.). **Leprosy with Special Reference to its Pathology.**—*Irish Jl. Med. Sci.* 1932. Dec. 6th. Ser. No. 84. pp. 693–702.

This paper gives a useful summary of recent work which has already been reviewed in this *Bulletin.* *L. R.*

DE WILDEMAN (E.). Plantes contre la lèpre (*Cynometra* sp.). Note préliminaire. [**Plants used for Treatment of Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 265–269.

The author reports that the people of the Ivory Coast use the products of certain plants applied to ulcerations in the form of a powder and one of the plants has now been identified as *Cynometra Vogelii*, but he cannot vouch for its value. *L. R.*

RAYBAUD (A.). Drogues végétales employées au Brésil contre la lèpre. [**Plants used for Leprosy Treatment in Brazil.**]—*Marseille-Méd.* 1932. Sept. 25. Vol. 69. No. 27. pp. 392–394.

This is another paper enumerating a number of vegetable species that have been used in the treatment of leprosy in Brazil, but without giving any evidence as to their value or otherwise. The most important is *Carpotroche brasiliensis* which is known to contain chaulmoogric acid.

L. R.

VAN HEUTSZ (J. B.). Lepra en U.C.B. (Leprarsol). [**Leprarsol in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 385–393. With 5 figs.

The writer reports a trial of a new preparation called leprarsol made by the Belgian Chemical Union with promising results in 18 cases. *L. R.*

WILSON (R. M.). **Occupational Therapy in Leprosy.**—*Chinese Med. Jl.* formerly *Nat. Med. Jl. China.* 1932. June. Vol. 46. No. 6. pp. 555–559. With 12 figs. on 4 plates.

The author once more reports the good effects of work and exercise as carried out in his Korean Leper Colony. *L. R.*

BORZONE (Rodolfo A) Inmunidad histógena y sindromes pluriglandulares en lepra Concepto y ensayo de clasificación y tratamiento etiopatogénico —*Semana Méd* 1932 Nov 17 Vol 39 No 46 (2027) pp 1455–1459 [14 refs]

FABIANI (G) Sur un cas de lèpre autochtone en Algérie —*Arch Inst Pasteur d'Algérie* 1932 June Vol 10 No 2 pp 177–179

NETTO (Solano) Cruzada anti-leprosa A lepra mista —*Brasil-Medico* 1932 Oct 15 Vol 46 No 42 pp 884–885

PISACANE (Carlo) Considerazioni sulla reazione di Rubino per la lebbra —*Riv Sanitaria Siciliana* 1932 June 1 Vol 20 No 11 pp 785–6, 789 English summary (4 lines)

SPRUE.

ASHFORD (Bailey K.). **The Differential Diagnosis of Sprue and Pernicious Anemia.**—*Amer. Jl. Trop. Med.* 1932. May. Vol. 12. No. 3. pp. 199–215. [23 refs.]

This article is submitted for information of and consideration by those who regard the diagnosis between sprue and pernicious anaemia as " merely a matter of geography " and the two diseases as in essence " identical or at least modalities of a common fundamental condition of nutritional character." It is an adequate summary of the similarities and differences from both the clinical and laboratory aspects and may be read with profit by those living in temperate climates who see in every case of emaciation with stomatitis and bulky stools an instance to be recorded as " non-tropical sprue." No fresh evidence is adduced ; it was not the author's intention to do so but to present and weigh up the facts already known to those familiar with the disease and this Professor Ashford has done with his customary ability. *H. H. S.*

RADL (Robert B.) & FALLON (Madeleine). **Nontropical Sprue with Duodenal Involvement and Tetany.**—*Arch. Intern. Med.* 1932. Oct. Vol. 50. No. 4. pp. 595–604. With 2 figs.

Another interesting case to be added to the list of those diagnosed non-tropical sprue—a man of 41 years, who had never been away from the north central region of the United States. He had been weakly from childhood. Eight years prior to the date of this record he began to complain of soreness of the tongue, and this had continued with periods of exacerbation. For the last two years gastro-intestinal symptoms have been troublesome—bulky but not frothy stools in the early morning, increasing in number for the past year. There has been loss of weight [" 10 kgm.", but within what period is not stated], but no nausea or vomiting. He had felt numbness and tingling in hands and feet for 4 years. On examination in July, 1928, the papillae of the tongue were atrophied, but no aphthae were seen. Blood pressure was low, 100 systolic, 70 diastolic, red cells 2,870,000 per cmm., Hb. 64 per cent., C.I. 1·1, moderate anisocytosis and slight poikilocytosis. Except for the bulky stools the symptoms cleared with liver treatment.

In February, 1930, his general condition was fairly good, but there were signs of duodenal stenosis and gastro-enterostomy was performed, a large duodenal ulcer being found. He made a good convalescence from the operation, but the diarrhoea continued and in June 1930 tetany supervened and the blood calcium was low, once down to 5·0 mgm. per cent. This was kept under control by calcium lactate and parathormone.

[This case is not so typical as those recorded by Professor THAYSEN ; the stools were never frothy, nor clay-coloured, the persistent tingling and numbness of the extremities are not a normal feature of sprue ; no analysis of the faeces is recorded. Also there developed a definite intestinal lesion—duodenal ulcer—which would account for some, at least, of the symptoms. In a footnote brief reference is made to another patient at present under observation with symptoms strongly suggestive of sprue. Report on the further course and developments of this case will be awaited with interest.] *H. H. S.*

GEILL (Torben). Et tilfaelde af ikke-tropisk sprue (Gee's sygdom). [**A Case of Non-Tropical Sprue.**]—*Hospitalstidende.* 1932. May 19. Vol. 75. No. 20. pp. 705–712. With 4 text figs.

Geill finds that non-tropical sprue is undoubtedly more frequent than is generally supposed to be the case, the most common mistaken diagnosis being that of some gastro-intestinal or endocrine complaint. The psychic manifestations may also be so prominent that neurasthenia, hysteria or a psychosis is diagnosed, as in Geill's case. The patient was a 4-para, aged 48, whose menopause dated a-year-and-a-half back. She had never left Denmark. During the last two or three years the stools had from time to time been very light-coloured and bulky. The abdomen was much distended, particularly in the evening. There was no albumen, sugar, blood or pus in the urine. Steatorrhoea, emaciation, atrophy of the tongue, a blood count of the pernicious type, a low calcium content of the blood, tetany, a low blood-sugar curve after the administration of glucose, and a high blood-sugar curve after an injection of adrenalin (which had little effect on the blood pressure and pulse-rate) were observed. Treatment with liver extracts had little effect on the anaemia, but treatment with calcium chloride and irradiated ergosterin was followed by improvement in the blood-calcium content, and by the disappearance of the tetany. The patient's general condition also improved.

C. Lillingston.

BAUMGARTNER (E. A.). **Gastric Acidity in Tropical Sprue. The Return of Free Hydrochloric Acid after its Absence over a Period of Years.**—*Clifton Med. Bull.* 1932. Apr Vol 18. No. 2. pp. 40–44.

The patient, a woman of 52, who had lived for 30 years in China, presented some of the symptoms of sprue. Gastric analyses carried out at intervals over a period of 11 years showed absence of free HCl (Ewald test) during the first 7–8 years, but it was present (3–4 in a total acidity of 20) when tested 3½ years later. The blood condition was not typical, on one occasion only was the colour index above unity, it was usually about 0·7 and there is no mention of erythroblasts at any time; chemical examination of the faeces is also not recorded. Obscure nerve symptoms—numbness, tingling, stumbling, dropping of objects—were complained of but no organic lesion was detected. The diagnosis of sprue was based on the previous residence in China, a history of sore tongue with flatulence, large frothy stools, anaemia and loss of weight. *H. H. S.*

VAN DER SCHEER (A.). Parenterale levertoediening bij tropische spruw. [**Parenteral Liver Administration in Tropical Sprue.**]—*Nederl. Tijdschr. v. Geneesk* 1933. Jan. 14. Vol. 77. No. 2. pp. 163–170. [16 refs.] English summary.

The English summary is as follows:—

. "Communication of the results of treatment of tropical sprue by subcutaneous or intramuscular injections of liver extract. Symptoms which had resisted the ordinary dietetic treatment during months or years disappeared mostly within a few weeks. This confirms the opinion that sprue is a deficiency disease. In West-India this deficiency is the result of insufficient feeding which leads first to anaemia and later on to sprue. In Dutch East India on the contrary the first symptom, observed in sprue, is an insufficient resorption of fat by the small intestines of which the cause is unknown. Afterwards, often after a long residence in Europe the characteristic glossitis and anaemia of a hypochrom or hyperchrom type develop." *H. H. S.*

DE RIVAS (Damaso) Some Remarks upon the Etiology of Sprue.—*Bol Asoc. Med de Puerto Rico* 1932 Nov Vol 24 No 206 pp 610–613

MISCELLANEOUS.

LAMBERT (S. M.). **Fourth Annual Report on Western Pacific Health Service, 1931.**—*Fiji Ann. Med. & Health Rep. for Year 1931.* pp. 42–46.

The Western Pacific Health Service is the agency under which the various island groups and the Rockefeller Foundation have co-operated ; it is under the immediate charge of a Deputy to the Central Medical Authority, who is Chief Medical Officer of Fiji. Its headquarters are at Suva.

Central Medical School.—An extension of the old Fiji Medical School. It has 40 students, 20 from Fiji, 4 each from Tonga, Gilberts and Ellices, Samoa, British Solomon Islands and 2 each from Cook Islands and New Hebrides. There is a permanent Tutor and a faculty of seven qualified men, two registered nurses and one Native Medical Practitioner. The course is one of 4 years. The weakness of the Native Medical Practitioner system has been the lack of inspection by a Medical Officer, but this is now partially remedied.

Hookworm Work.—Mass treatments have been employed in the British Solomons, New Hebrides, Ellice and Fiji, with carbon tetrachloride, and ethylene tetrachloride or tetrachlorethylene. Symptoms of apparent anaesthesia due to the latter drug have alarmed some of the natives ; but, it seems, without sufficient cause.

"Apart from these added cerebral symptoms, ethylene tetrachloride gave fewer symptoms than carbon tetrachloride, and we consider it a safe, desirable anthelmintic for hookworm. Carbon tetrachloride is also considered a safe desirable drug for Melanesians and Polynesians, and in combination with chenopodium a safe drug for East Indians. There has been no death from its use now since 1924. During our last four years of treatment work in the South Pacific with ethylene tetrachloride and carbon tetrachloride in 106,029 treatments there have been no deaths and few untoward symptoms. The dosage of these drugs has been unchanged for ten years. Three minims to the year with an adult dose of 45 minims of carbon tetrachloride and ethylene tetrachloride ; a mixture of two parts of carbon tetrachloride to one of chenopodium for Indians, two minims to the year of this mixture with an adult dose of 36 minims."

Yaws.—During the past 4 years 220,000 injections of neoarsphenamine or sulpharsphenamine have been given by laymen or native practitioners without a death. The cost has been one penny a decigram, so that with 5 decigrams for an adult dose and 2 or 3 injections, the adult cost has been about a shilling.

" These mass treatments have been given because study showed that in untreated groups the whole population was infected by the age of 12 or 13 to 16, and that among such youths there was always a great number of individuals who at any particular time that treatment rounds were given would show no symptoms or signs, who afterwards would break out with presumably infectious yaws and presumably these kept the disease alive."

In Nui, one of the Ellices with a population of 402, inspection three years after treatment by Native Practitioners showed yaws to have almost disappeared.

Ringworm.—Both Tinea imbricata and Tinea versicolor are found in Fiji ; and it has not been possible to distinguish them. Natives believe that those who live near rivers some distance from the sea are most apt to be infected with Tinea imbricata. Treatment has been by painting with a saturated solution of salicylic acid in strong tincture of iodine. It is not easily cured. Of 164 cases treated in Bua province and re-examined a year later 60 were cured (five had had sulphur fumigation only).

The total treatments during 1931 for the three conditions were 85,610, and the total cost £2,770 18s. 10d., the cost per treatment being 7·7 pence, and in Fiji no more than 4·2 pence. One unit treated both yaws and hookworm, without difficulty.

Bore-hole Latrines.—During the year 1,260 were installed and now there are less than 50 dwellings without adequate sewage disposal within a radius of 9 miles of Suva.

In the New Hebrides a Native Practitioner just arriving is the first to serve in the group and "he may be the germ of a Condominium Medical Service." A second Native Practitioner is just arriving in the Solomons.

It is increasingly evident, writes Dr. Lambert, that most of the problems of public health and preventive medicine in the South Pacific will be solved best by the extension of the Native Medical Practitioner system. Where these men are treated sympathetically they have had a large measure of success, and together with native obstetric nurses, who should be trained in increasing numbers, they should manage the native welfare work over which the Fijians are enthusiastic. *A. G. B.*

CILENTO (R. W.). **The Value of Medical Services in Relation to Problems of Depopulation.**—*Med. Jl. Australia.* 1932. Oct. 15. 19th Year. Vol. 2. No. 16. pp. 480–483.

This interesting and suggestive paper was read at a meeting of the Australian and New Zealand Association for the Advancement of Science. Hitherto the view of W. H. P. RIVERS [see this *Bulletin*, Vol. 20, p. 83] on the causes of depopulation in the Pacific has influenced men's minds, namely that owing to the suppression of native customs, such as head-hunting, the natives have lost all interest in living, succumbing easily to infection and not caring to bring children into the world. To Cilento, however, this is not a cause but an effect, being a direct sequel of disease and of faulty nourishment.

The author shows that apart from humanitarian reasons the depopulation problem is vital because if the races in question are lost they can only be replaced by others "bringing with them economic, social and political obligations of a very grave character." He visualizes the effects of European intrusion as occurring in three stages :—

(1) A stage in which diseases, arms, alcohol are introduced, tribal life is dislocated, and the virile members of the community are recruited for labour, with a large and immediate decline ; this period has long ceased in the Pacific.

(2) A period of partial adjustment, the European imposing his scales of value on the native, and the native imitating European ways of life, with little success for either. The native loses the safeguards of savagery and fails to replace them by protective European customs. This condition of unstable equilibrium is seen in many areas in Melanesia, in which the population is oscillating or slowly decreasing.

(3) The factors for decline get the upper hand and the race disappears or adjustment is affected and population increases again.

During the first period with the prohibition of head-hunting and cannibalism there goes also pig-raising and the hunting a large vitamin-rich fish, and with the occupation by the planters and traders of the best land the native becomes resigned to the decrease in the available food supply, he becomes less virile and practises abortion or infanticide, thus adapting himself to the lessened food supply.

In support of the view that " hopelessness " is secondary rather than primary Cilento writes :—

> " Population was found to be declining in places where native institutions flourished with all their original vigour, as well as where they had been destroyed so long as foodstuffs were scanty and disease rife, and people were found thriving in places where white men had entirely disrupted their social organization (as, indeed, they must inevitably disrupt it everywhere in the course of time), but only where disease was controlled and food abundant."

Specific instances are given. The two factors of disease and food deficiency form a vicious circle. The author deals with the section of popular opinion which advocates the introduction of more virile natives and shows that were the local natives to tolerate such introduction history indicates that it would be useless. The problem, which is one of a generation, is to combat food deficiencies and the diseases to which they add a fatal virulence. It is stated that " the native women reach a stage of infertility at an early age (perhaps after the birth of one child or two) and this could be and often was corrected by introducing into the diet large quantities of the growing shoots of plants and other items rich in vitamins." Apart, however, from deficiencies in proteins and vitamin-rich foods the staple yams and taro that make up the main carbohydrates of the diet are threatened, for with European plantations come pests which attack the native staples ; in several localities taro can no longer be grown.

South Melanesia though free from malaria is handicapped by the immigration of Asiatics and their diseases. The distribution of amoebic dysentery and of *A. duodenale* appears to coincide almost exactly with that of the Asiatic population.

There are thus phases in medical administration that go beyond the range of ordinary medical work ; anthropology and agriculture also come in. " The value of medical services in relation to depopulation consists essentially in the degree to which medical services are linked with these complementary and co-operative activities." Finally he stresses the outstanding need for a centre for the adequate exchange of medical information, opportunities for a wider field of interest and better prospects in medical and personal status for the doctors concerned. *A. G. B.*

PLACIDI (Th.). La médecine et l'hygiène aux Nouvelles-Hébrides. [**Medicine and Hygiene in the New Hebrides.**]—*Rev. Méd. et Hyg. Trop.* 1932. Nov.–Dec. Vol. 24. No. 6. pp. 277–319. With 2 figs.

A continuation of the long paper the first part of which was noticed in this *Bulletin* [Vol. 29, p. 801].

Diseases of the New Hebrides :—

Malaria is the most serious disease ; three-fourths of the morbidity is attributable to it. One island only, Futuna, in the south of the group, is free. The species of Anopheles mentioned is *A. punctulatus. P. vivax* and *P. falciparum* are found, with a slight predominance of *vivax.*

Amoebic dysentery is only less widely spread than malaria. The author adds, in a footnote, that BUXTON considers this to be probably bacillary because liver abscess is rare, but the author contests this opinion. " Numerous microscopic examinations made by us authorize us to affirm the contrary." Dysentery was little noticed till the introduction of the Indo-Chinese. Placidi thinks it is spread by the manuring habits of the gardeners.

Yaws or *tonga* is widespread, chiefly amongst the Kanakas. Its contagiousness is recognized, for a native refuses to use a path along which a tonga infected native has passed. Sabre tibia is not rare but goundou has not been reported. Intravenous injections cannot be given owing to the aversion of the Kanakas to them. Stovarsol is used in tablet form.

Diseases which are unknown are plague and cholera on the one hand, and diphtheria, scarlet fever, mumps, variola and varicella on the other. Cases have been reported of typhoid and cerebrospinal meningitis but the author thinks it likely, from his own experience, that these were forms of malaria.

Tetanus is frequent and generally fatal for there is no means of preserving antitetanic serum. *Tuberculosis* is common and is disquieting for the future. The conditions in which the Kanakas live are well known. *Blackwater fever* is found in the centre and north of the archipelago, in islands where malaria is hyperendemic. A colleague treated in 2 years more than 200 cases with only 2 deaths and the author has treated 8 cases out of 600 plantation labourers. [It would be interesting to know more of this very mild blackwater.] It is chiefly the Asiatics who suffer.

Ankylostomiasis is very common, the worm being Necator. Examination at Santo showed 320 of 350 persons to be infested. LAMBERT gives similar figures for most of the islands. *Filariasis* is common, but less so in the southern than in the northern isles ; it is nocturnal and due to *W. bancrofti,* and probably transmitted by *S. variegata.* In Santo 23 of 130 labourers were found infected, 17·6 per cent. The usual symptoms are lymphatic varix and adenitis. Only 3 cases of elephantiasis were seen during the author's stay in the group, but it is thought to be commoner than this would indicate.

Beriberi at times causes important losses, rarely amongst the Kanakas who supplement their diet from their gardens ; chiefly among the Chinese and Annamites. Clinically the paralytic form is the most usual (80 per cent.). The author regards it as a toxic infection of intestinal origin, perhaps favoured by a dietary deficient in vitamins.

Leprosy was probably brought from Queensland and New Caledonia by repatriated Kanakas ; it is chiefly found in the southern isles. There seem at present to be few cases. *Syphilis* appears to have extended since the Indo-Chinese introduction : it is much rarer among the Kanakas. *Gonorrhoea* is rare. *Itch* is less common than is usually supposed. *Phagedaenic ulcer* comes second to malaria in causing incapacity in plantation labourers. *Tinea imbricata* or tokelau is found only in the northern isles and in Banks Is.

The last part of the paper deals with general hygiene in its application to the New Hebrides. The headings are—Recruiting and introduction of labour; Hygienic organization of plantations, with subheads, housing, diets; Disposal of excreta and domestic wastes; Hygiene of infancy; Moral hygiene; Hygiene of clothes; Sanitary service of a plantation—almost a textbook of its subject. *A. G. B.*

STRONG (W. M.). **Nutritional Aspects of Depopulation and Disease in the Western Pacific, especially in Papua.**—*Med. Jl. Australia.* 1932. Oct. 22. Vol. 2. 19th Year. No. 17. pp. 506–512.

The author, who has worked for the last 28 years in Papua, discourses of his experiences of beriberi, scurvy, Vitamin A deficiency, tuberculosis, influenza, and native dietaries. He barely touches on depopulation. *A. G. B.*

LEFROU (G.) & ALLARD. Une décade démographique (1921–1930) à Saint-Louis-du-Sénégal. Natalité, mortalité générale, mortinatalité, mortalité infantile. [**Vital Statistics of S. Louis, Senegal.**] —*Ann. de Méd. et de Pharm. Colon.* 1932. Apr.–May–June. Vol. 30. No. 2. pp. 406–427.

Saint Louis du Senegal is the most ancient African possession of the French. In 1929 its population was 18,147 of whom only 457 were Europeans. The sanitary conditions of the town are extremely bad. The crude birth rate has varied little between 1921 and 1930; it was 57 per 1,000 in the former and 59·6 in the latter year. The crude rate of mortality was 43·3 per 1,000 in 1921 and 35·9 per 1,000 in 1930, but the latter rate followed on one of 57·7 in 1929, in which year plague was epidemic (502 cases with 294 deaths). The still birth rate varied from 67·1 to 57·0 per 1,000 births. Infant mortality varied from 203 per 1,000 live births in 1921 to 166 in 1930; the minimum rate was 117 in 1927–28. The seasonal maximum of mortality is in October. Pulmonary tuberculosis is a frequent cause of death. In 1925 and 1930 several deaths from measles were recorded and the authors suspect infection from Europe. They think the attributions of deaths to malaria are inaccurate. *M. Greenwood.*

DE MARQUEISSAC. Enquête et sondages démographiques en pays Kabré (Nord-Togo). [**Vital Statistics of the Kabré Country.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 986–992.

This is a demographic report on a portion of the Kabré country (northern Togoland), where sleeping sickness is rife. In the area studied the density of population was 90 per square kilometre. The age distribution, shows, in comparison with the English "standard million" (census population of 1901), a great excess of young and defect of old persons. The rate of mortality, unstandardized, was slightly less than 23 per 1,000, the birth rate approximately 50 per 1,000. The still birth rate is not high, it is about 15·5 per 1,000 confinements. The rate of mortality in the first year of life on live born children is very high, about 307 per 1,000. Of 794 women aged 45 years or more 779 have borne children and had amongst them 5,126 pregnancies, i.e. 6·59 pregnancies per woman. A consideration of the number of survivors to the age of 14 leads to the conclusion that every married woman of 45 leaves 3·5 living children having lost 3 others. *M. Greenwood.*

SOCIEDAD ARGENTINA PATOLOGIA REGIONAL DEL NORTE. Séptima Reunión. . . celebrada en Tucumán los dias 5, 6 y 7 de octubre, 1931. Dedicada a conmemorar el cincuentenario del primer trabajo de Finlay sobre la transmisión de la fiebre amarilla por el mosquito. [**Report of Seventh Congress of Northern Argentine Pathological Society.**]—pp. xviii + 526. With numerous illustrations. 1932. Buenos Aires: Imprenta de la Universidad.

This volume of reprints of papers read at the Seventh Congress of the Northern Argentine Pathological Society, held at Tucumán at the beginning of October, 1931, comprises 43 articles arranged under three main heads. Part I consists of 24 papers dealing with experimental and clinical medicine, preceded by a brief but interesting narration by Professor W. H. HOFFMANN of the chief features of the life and work of Charles FINLAY. This section deals with a variety of subjects including tuberculosis, goitre, undulant fever, climatic bubo, poisoning by snakes and spiders. Others of sufficient importance to be reviewed separately in the *Tropical Diseases Bulletin* or *Bulletin of Hygiene* are: attempts at cultivating *Myco. leprae*; the prevalence of scarlet fever in Jujuy; and undulant fever in Santiago del Estero.

Part II, 17 papers, is concerned with Mycology, clinical cases of various forms being recorded—blastomycosis, moniliasis, aspergillosis, actinomycosis and mycetoma.

Part III contains a single article on the treatment of American leishmaniasis by Fouadin; this is contributed by Doctor Salvador MAZZA, President of the Society.

The work as a whole is well illustrated with coloured plates, and microphotographs well reproduced. *H. H. S.*

SHILLONG. **King Edward VII Memorial Pasteur Institute and Medical Research Institute. The Fifteenth Annual Report for the Year ending 31st December 1931** [MORISON (J.), Director].—46 pp. 1932. Shillong. [3s. 6d.; Rs. 2. As. 6.]

In addition to tables of data regarding the routine work of the laboratory some interesting observations are made with regard to bacteriophage and its preparation for cholera and dysentery. Fresh phages are obtained with certainty week by week and fresh bacteria are also procured. At the time of writing 64 different combinations of bacteria and phage were being employed in each brew. The subject of change in the character of the vibrio under the action of bacteriophage is just referred to. "Vibrios isolated from cases of cholera are usually smooth," but batches were found towards the end of a Calcutta epidemic which were mostly rough and resistant to type A phage. "Such a rough 'A' resistant vibrio if made resistant to 'B' or 'C' types of phage was apparently changed to a smooth strain."

An important field experiment in the use of cholera phage progresses favourably: "In Nowgong the phage was placed in the hands of the village headmen. . . . with instructions to give the phage to every case of diarrhoea, dysentery and suspected cholera. Habiganj was kept as a control. Up to the time of writing five successive epidemic seasons have passed without an outbreak in Nowgong, while in the control area there has been an outbreak each season. . . . The experiment has now been extended to Habiganj and cholera vaccination has ceased in both areas."

A considerable section of the report deals with malaria operations. In many places evidently anti-larval measures are impracticable and in such places the only practical proposition seems to be treatment.

W. F. Harvey.

HARVEY (W. F.) & HAMILTON (T. D.). **Studies on Blood and Tissue Reactions.**—*Edinburgh Med. Jl.* 1932. May, June & July. Vol. 39. Nos. 5, 6 & 7. pp. 285–310; 349–367; 439–447. With 5 figs. [87 refs.]

In this paper the authors describe the technique they have adopted for the study of the cells of the blood. They appear to have taken nothing for granted and have tested every procedure for themselves, even such simple ones as the pricking of the finger for obtaining blood and the cleaning of the slides. They point out many sources of error which, though apparently trivial, will, if neglected, lead to imperfect preparations and incorrect interpretations. Having established for themselves a standard technique they proceed to the differential blood-cell count and test such points as the distribution of leucocytes in different parts of the film and their variations in blood drawn from different parts of the body and at different times of the day in relation to food, sleep and other factors. The general conclusion is that there is not a very large error in making a single leucocyte total count provided the necessary precautions are taken, while the differential cell-count on a well-made, and to a surprising extent on an ill-made film is significantly valid for diagnostic purposes. There is evidence of long-wave diurnal oscillation of leucocyte numbers and proportions, but not sufficient evidence of a superimposed periodic short-wave type of fluctuation. All sorts of factors, such as sleep, posture, heat and cold, muscular exercise, locality of examination, digestion and simple ingestion, may be regarded as traumata and may produce leucocytic variation of greater or less duration and may combine together to enhance or to mask the variation due to any one factor singly.

C. M. Wenyon.

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1932. Sept. Vol. 25. No. 11. pp. 1703–1728 (Sect. Trop. Dis. & Parasit. & Sect. of Med. pp. 111–136). With 12 charts & 2 figs. [Numerous refs.]—**Discussion on the Megalocytic Anaemias of Tropical and Non-Tropical Countries** [WITTS (L. J.); FAIRLEY (N. Hamilton); GOODHART (Gordon); WILLS (Lucy); STEWART (M. J.); LIGHTWOOD (Reginald); VAUGHAN (Janet)].

Dr. L. J. Witts pointed out that the terms "pernicious anaemia" and "megalocytic anaemia" were by no means synonymous. The frequency distribution curve constructed by PRICE-JONES embraced all the possible variations in diameter of healthy erythrocytes; cells which fell to the right of the normal curve were megalocytes and a megalocytic anaemia was one in which such cells were present. The curve of the distribution of red cell diameters gave much more information than the mean diameter of the cells, for megalocytes were always pathological whatever the diameter, and their appearance in the peripheral blood connoted proliferation of megaloblasts in the bone marrow which was liable to occur under two sets of circumstances. Firstly, in the anhaemopoietic anaemias like pernicious anaemia, vitamin B deficiency and certain intestinal anaemias, or in the fatty diarrhoeas such as occur in sprue, coeliac disease, chylous and pancreatic diarrhoea and gastro-colic fistula, the nutrition of the blood-forming organs is disturbed with the production of megaloblastic degeneration of the bone marrow and a decreased formation of blood: such types accounted for 90 per cent. of the megalocytic anaemias met with in England. Secondly, there were acute and chronic haemolytic anaemias such as occur in leukaemia, lymphadenoma and splenic anaemia when blood formation was greatly accelerated with hyperplasia of megaloblastic tissue and increased blood destruction. These anaemias were usually, but by no means always, of megalocytic type: the degree of anisocytosis was rarely high and the whole curve of distribution of the red cell diameters presented the appearance of being shifted bodily to the right; this suggested that they were due to a morbid haemolysis rather than to any primary distribution of the bone marrow itself.

Dr. Gordon Goodhart recorded a short series of cases of non-tropical megalocytic anaemia with high color-index which could not be classified as pernicious anaemia, pointing out that although the title of his contribution was "chronic haemolytic anaemia" he regarded most of them as aplastic rather than haemolytic in origin. They possessed certain features in common: all had grave anaemia with a high color-index, all had a very definite megalocytosis, and all failed to respond to liver extract administered by the mouth. Two other features were noticeable. The Price-Jones curve, although shifted well to the right, did not show the marked asymmetry characteristic of pernicious anaemia and in some cases it was as symmetrical as the normal curve. Secondly, there was an absence of the large, characteristic polymorphonuclear cells with hypersegmentation of the nuclei that are constantly seen in pernicious anaemia; all except one case showed a leucopenia of lymphoid type and in several there was a definite shift to the left in the Arneth count.

Dr. N. Hamilton Fairley stated that the only tropical haemolytic anaemia of megalocytic type occurred in Oroya fever, which was due to *Bartonella bacilliformis* located in the red corpuscles. The Bartonella anaemias were of great interest owing to the rapidity with which megaloblastic hypertrophy of the bone marrow ensued. The other haemolytic anaemias, such as malaria, invariably induced an erythroblastic response associated with an anaemia of normocytic or secondary type. Megalocytic anaemias of nutritional and alimentary origin were of more importance in the tropics, the bone marrow generally responding to the administration of adequate quantities of liver extract or marmite with reticulocytosis and rapid blood regeneration. Particular attention was directed to the differentiation of tropical sprue and pernicious anaemia, the duality of the two diseases still being denied by some; in severe cases the anaemias were often very similar in type. The predominance of gastro-intestinal symptoms with fatty, gaseous diarrhoea especially in the morning, the marked loss of weight, the absence of both neurological features and of the lemon tinting of the skin in sprue were important points in diagnosis, while at autopsy the lack of yellow subcutaneous fat, the small heart, the atrophied intestine and the appearance of the bone marrow enabled sprue to be recognized. Some 70 per cent. of sprue cases secreted acid after a histamine test meal. Typically the total faecal fat was increased in amount though adequately split and the glucose tolerance curve was flattened, findings which indicated defective absorption of fat and glucose respectively. The bilirubin content of the blood, though slightly increased in sprue, rarely exceeded 2·0 van den Bergh units. Sometimes achylia gastrica persisted after all intestinal symptoms of sprue had disappeared and true pernicious anaemia occasionally eventuated under these circumstances.

Dr. Lucy Wills dealt with the subject of tropical macrocytic anaemia which was especially common in pregnant women in Southern India, China and West Africa: it was quite distinct from the so-called "pernicious anaemia of pregnancy." The disease was seasonal, in India occurring between October and April, and it affected all communities and grades of society. In most patients rice formed an important part of the diet. Patients were often admitted to hospital in the 7th and 8th month and premature labour followed with either rapid improvement or collapse and death. In non-pregnant patients the disease was far more chronic. The symptoms, other than those referable to the anaemia, were very variable; and included sore tongue and mouth and splenomegaly. Fever, vomiting and diarrhoea were sometimes marked features, but these were probably related to the incidence of diarrhoea in the general population. The anaemia was severe, 32 out of 54 cases having initial red cell counts below a million. The death rate before the discovery of liver extract was high (42 per cent. in BALFOUR's series) and fell only to 33 per cent. in a subsequent series treated with liver extract owing to patients being so frequently moribund on admission. Later, after the speaker had discovered the value of marmite (yeast extract), the death rate fell considerably. The blood picture was macrocytic, normoblasts and megaloblasts were present, and the Price Jones curve showed a shift to the right and a marked increase in variability. Poikilocytosis was not marked, nor was the serum bilirubin increased. Normal acidity was the rule while the white cell count was variable in pregnant cases: leucopenia was common in the non-pregnant. The serum calcium was normal, but the non-protein nitrogen and urea in the blood were moderately increased in severe anaemia. Large doses of liver extract or a teaspoonful of marmite 3 or 4 times daily was followed by rapid improvement with a maximal reticulocytosis on the 5th day. The anaemia was probably of nutritional origin and the curative action of these remedies appeared to be due to some part of the vitamin B complex other than B1.

Dr. Price Jones said that the common feature of every sample of blood-cells in health and disease is "anisocytosis" or inequality of size.. The chief use of "distribution curves" was to express this anisocytosis, or the variability of the diameter of the cells. From the distribution the mean diameter was calculated and the position of the curve and mean diameter was shown in relation to the normal curve and mean diameter which he had derived from the measurement of 50,000 healthy red cells. This position enabled us to say if the distribution was megalocytic, microcytic, or both, or neither. By enumerating the cells distributed outside the limits of the normal distribution, it was possible to estimate the degree of megalocytosis or microcytosis as the case may be. The curve also showed if the distribution is symmetrical or skew. In anaemia there was no correlation between the mean diameter and the degree of anaemia. There was, however, a direct correlation of the anisocytosis or variability and the severity of the anaemia. He suggested that in conditions associated with marrow dysfunction the curve was shifted to right or left and the distribution had high variability and was more or less asymmetrical or skew. In those conditions in which the cells were acted on by some common factor in the circulation, and only indirectly or secondarily associated with disordered haemopoiesis, the variability was more frequently normal or relatively slight, and the distribution was more or less symmetrical.

Dr. Janet Vaughan said that in investigating a series of thirteen cases of coeliac disease or idiopathic steatorrhea in adults, she had found two with a megalocytic hyperchromic anaemia. In view of the observations of Dr. Lucy Wills on the treatment of tropical anaemia, both patients had been given large daily doses of marmite. In both there had been prompt improvement, the reticulocytes reaching the maximum level calculated from the initial red-cell count. The return to a normal blood-picture had been associated with a notable gain in weight, as in Addisonian pernicious anaemia. Other symptoms, e.g., diarrhoea and tetany, had been unaffected. She presumed, therefore, that marmite exerted a direct effect upon disordered haemopoiesis. *N. Hamilton Fairley.*

GUPTA (N.). **The Anaemia of Pregnancy.**—*Indian Med. Gaz.* 1932. Aug. Vol. 67. No. 8. pp. 421–432. With 5 graphs & 9 figs. (2 coloured) on 3 plates. [24 refs.]

This anaemia occurs in Bengal as a distinct disease associated with pregnancy. The extent to which ankylostomiasis, malaria, sprue and other diseases are involved in the aetiology of pregnancy anaemia is questionable.

It is a disease as distinct in its entity as pernicious anaemia of the Addisonian type. The fully-developed clinical picture leaves a distinct impression on the mind of the observer. The face is usually pale, the conjunctivae white, but the patient is much less emaciated than would be naturally expected. The tongue is glossy and flabby; soreness may be noted, but is not customary. Diarrhoea is commonly complained of. A small degree of pyrexia is usual. The disease occurs in all communities in Bengal, in town and country, whilst Anglo-Indians and Jews suffer less in proportion and severity; the pure Europeans are practically unaffected.

The present study is based on 203 cases all admitted at, or nearly at, full term. The few complications consisted of malaria (2), ankylostomiasis (2), amoebic dysentery (1) and syphilis (15). The cases in the series can be tabulated into three groups: (1) Red cell count one million or less, 36 cases. (2) Red cell count between one and two millions, 114 cases. (3) Red cell count between two and three millions, 53 cases. The mean average red cell count was 1,530,000, the average colour index 1·1 and the leucocyte count 7,485 per cmm.

These figures are compared with the blood condition of pregnant Bengali women of the hospital class in 55 cases. The blood picture worked out at three millions per cmm., the percentage of haemoglobin 55 per cent. and the colour index 0·9.

In the microscopic blood picture the most striking feature is the marked decrease in the red cells. Basophilia was noted in 20 per cent. of the cases, anisocytosis and poikilocytosis in 74·3, normoblasts or pronormoblasts in 25, and true megaloblasts in 0·4 per cent. All these features indicate an active regeneration of the bone marrow.

The response to liver dietary is not like that of true pernicious anaemia. Unlike pernicious anaemia there is a more or less normal leucocyte count of 7,430 per cmm. In the differential count neutrophiles number 70 per cent. The urine showed no distinctive features, whilst *B. welchii* was present in the faeces in two cases.

The Hindu community produces the greatest number of cases, 57·9 per cent., the Mohammedans 10·24 per cent., Indian Christians 25·5 per cent., Anglo-Indians 3·13 per cent. and Jews 1·23 per cent. The highest frequency of anaemia of pregnancy is between the ages of 15 and 20 years with a steady decline after 25 years. Primiparous women are most affected, but there is a sudden rise in the 8th or 9th gravidas. From a pathological viewpoint the most striking feature is the deposit of free iron in the internal organs. The spleen is enlarged and shows histologically myeloid hyperplasia and haematopoietic changes, the cells of the reticulo-endothelial system are proliferated.

The syndrome complex of pregnancy anaemia is rarely seen in any other condition except pregnancy amongst the general population of Bengal.

No support has been adduced in favour of KNOTT's hypothesis that this anaemia is associated with haemolytic strains of streptococci or *Bact. coli*; on the other hand most of the patients have suffered from some form of anaemia-producing tropical disease at some period of their lives and the effect upon the blood-forming organs is by no means negligible.

Treatment consists in paying detailed attention to the dietary, especially during the first trimester, whilst any septic focus should be removed. Liver and vitamin treatment have a better result in the first half of pregnancy, whilst exerting little effect in the 3rd trimester. Intramuscular injections of blood (20 cc.) on alternate days may improve the blood during the first half of pregnancy.

(The Editorial in this number of the *Indian Medical Gazette* summarizes the present knowledge of the anaemia in a detailed manner. The designation "*Tropical anaemia of Pregnancy*" is preferred to ambiguous titles. It has been suggested by MACKIE (1929) that there is a peculiarly fatal type of anaemia, an anaemia *sui generis*, which is not confined to pregnant women or to sprue patients. He considers it an aplastic anaemia and to be distinguished clinically and haematologically from Addison's disease. BARDY in 1924, published notes on 68 cases collected from the medical literature of Europe and the United States over a period of 38 years which gives an incidence of 1 per 10,000. In India the figures are totally different and in the statistics collected so far show an incidence of 29·3 per 1,000 or about 300 times the figure for Europe.) *P. Manson-Bahr.*

BONNE (C.). Eenige weinig bekende feiten van klinische beteekenis omtrent het primaire levercarcinoom. [**Some Little Known Facts concerning Liver Carcinoma of Clinical Significance**].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Vol. 72. No. 7. pp. 389–392.

The frequency of primary liver carcinoma in tropical lands as compared with the temperate zone entitles it to be called a tropical disease. In typical cases the liver is greatly enlarged and painful and the numerous metastases are localized to the liver itself. Liver function may be little disturbed up to shortly before death, which may take place with symptoms of acute hepatic insufficiency. This retention of function is explainable by the fact that the tumour is essentially a liver cell tumour, with maintenance of considerable resemblance to the cells of origin. Ingrowth of tumour into portal vessels is one of the characters of the tumour and may even bring about total thrombosis in the portal tract. Cirrhosis is almost invariably associated with primary liver carcinoma and as cirrhosis can bring about diminution in size of the liver, so it is found that the carcinoma may sometimes develop in a small liver. Difficulty may sometimes be found in differentiating between liver abscess and carcinoma. It may even be difficult to make out from the necrotic material of puncture which of the two conditions is present. If distant metastasis does take place it is usually to the lung but it may be to bone and a spontaneous fracture may be the first symptom to attract notice. *W. F. Harvey.*

i. THONNARD-NEUMANN (E.). **Treatment with Di-Hydranol of Intestinal Protozoal and Helminthic Infections in Man. A Preliminary Report.**—*Twentieth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1931. pp. 122–126.
ii. MACKIE (Thomas T.). **Di-Hydranol in the Treatment of Intestinal Protozoal Infections.**—*Ibid.* pp. 126–131.

i. The summary gives a full account. The work was done in Colombia.

" Di-hydranol, a resorcinol derivative, was employed in the treatment of 105 individual intestinal infections encountered in 31 male adults. It was administered in a solution of olive oil in gelatin capsules.

" Uncinaria (23 cases) and Trichuris trichiura (22 cases) generally proved refractory to the drug, whereas 4 cases of ascariasis showed a good response.

" Di-hydranol proved itself of decided value in the treatment of 28 carriers of E. histolytica. Three-fourths of the infected cases became negative under treatment. Five of the seven cases which showed unsatisfactory results were very heavily infected, though none of them showed any acute dysenteric symptoms. The clinical response in three cases with acute dysenteric symptoms was very satisfactory. Thirty-two per cent. of the cases developed cysts during the treatment; and the effect of the drug upon these was poor, as 6 out of 9 remained positive. [It is stated—" It is extremely difficult to follow the cases for observation."]

" Very encouraging immediate results were obtained in Giardia lamblia infections—in 14 of the 21 cases the stools became negative. Of the 19 instances in which patients showed co-existing infections with Endamoeba and Lamblia we succeeded in freeing the carriers from both infections in eight instances.

" The 7 cases of infection with Strongyloides yielded, without exception, to Di-hydranol."

The results obtained in Strongyloides infection were far superior, the author says, to those obtained with any drug hitherto employed by him.

ii. Mackie, whose trials were made in Guatemala, says that the standard dose for adults was 4 pills of 0·15 gm. each three times daily after meals for eight consecutive days, and that no toxic effects were noticed.

Here again a proper follow-up was impossible. His conclusions are not so favourable as those of NEUMANN.

" 1. Di-hydranol in doses up to 20 grams in 9 days for adults, and in proportion for children, was well borne and not associated with the development of toxic symptoms.

" 2. Its effectiveness against Giardia lamblia appears to vary directly with the dosage since only the larger amounts resulted in apparent cure.

" 3. When given to children in proportion to age, the total amount appears to be insufficient for therapeutic purposes.

" 4. Di-hydranol has little or no effect on other intestinal protozoa with the possible exception of Iodamoeba butschlii which seems to be susceptible to its action."

A number of tables is given in each paper. *A. G. B.*

MALARET (P. S.). **Antityphoid Vaccination.**—*Twentieth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass. 1931.* pp. 165–170. [Summary appears also in *Bulletin of Hygiene.*]

In a civil population in Cuba it has not been found practicable to administer prophylactic vaccination against typhoid fever in the ordinary manner by a course of three injections. Following the practice developed in the Argentine Army of giving a single inoculation of high concentration the Cuban Army authorities have taken up the method and report even better results than when the three-dose method was carried out. In view of these results the method has now also been applied to the Cuban civilian population but the dose of the vaccine was halved so that 2,500 millions of killed bacilli are injected, suitable decreases being made for younger subjects. The reactions following this single injection with larger dosage do not appear to be more severe than those following the three injections, and the results of agglutination tests before and after inoculation point definitely to the production of antibodies. During 1931, 8,120 single high dose injections have been given and in the same year of 42 cases of typhoid fever admitted to hospital two had previously received single dose inoculations. *A. Joe.*

ROY (J. N.). A propos de l'étiologie du goundou. [**Etiology of Goundou.**]—*Rev. Méd. et Hyg. Trop.* 1932. July–Aug. Vol. 24. No. 4. pp. 169–175.

In this article Roy reprints several pages of a previous publication in order to reiterate his belief that goundou is not caused by yaws any more than it is by syphilis. For him the etiology remains unknown. *H. S. Stannus.*

Cawston (F G) The Principles of Early Treatment of Tropical Disease, with Special Reference to Malaria in Natal —*Jl Trop Med & Hyg* 1932 Dec 15 Vol 35 No 24 pp 371–372

Goette Reisebrief ueber die Ausbildungsreise des Schulkreuzers ' Emden " nach Ostasien, Sudsee und Afrika vom 1 Dez 1930 bis 8 Dez 1931 —*Arch f Schiffs u Trop Hyg* 1932 Dec Vol 36 No 12 pp 637–650

Lee (H B) Some Notes on Hospital Management in Nigeria —*West African Med Jl* 1932 Oct Vol 6 No 2 pp 22–25 An excellent article which cannot be summarized

MacVicar (N) The Prevalence of Certain Diseases among the Natives of the Ciskei —*South African Med Jl* 1932 Nov 26 Vol 6 No 22 pp 721–724 With 1 chart

Ramali (A) Een geval van tropica- 'appendicitis "—*Geneesk Tijdschr v Nederl -Indië* 1932 Nov 8 Vol 72 No 23 pp 1611–1612

Sergent (Edmond) Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1931 —*Arch Inst Pasteur d Algérie* 1932 Mar Vol 10 No 1 pp 119–151 [52 refs]

REVIEWS AND NOTICES.

GARIN (Ch.) [Professeur agrégé à la Faculté, Médecin des Hôpitaux de Lyon], ROUSSET (J.) [Ex-Interne des Hôpitaux de Lyon, Chef de clinique à la Faculté] & GONTHIER (B.) [Médecin-chef de la Cie des Mines de Roche-la-Molière et Firminy]. **L'ankylostomose.** [Ankylostomiasis.]—128 pp. With 56 figs. 1932. Paris-6: Masson et Cie, 120 Boulevard Saint-Germain. [36 fr.]

It appears that the intention of this monograph is to aid in attacking hookworm infection in mines. Its statements should be accepted with caution, and proof reading has not been close enough to detect obvious errors. The morphological section contains a number of mistakes, makes no mention of *Ancylostoma braziliense*, and in spite of Opinion 66 rendered by the International Commission on Zoological Nomenclature of 1915 continues to call the genus *Ankylostoma*. As the result of longitudinal sections of worms it is confirmed that blood and iron-containing yellow pigment are present in the intestinal contents. The author's estimate of the daily rate of oviposition is 2,600 eggs by each female, independent apparently of species. The various tropisms of infective larvae are accepted. Ground itch is so rare in the authors' experience that they range themselves with those who conclude that, in its marked form at least, it is due to bacterial contamination. In treatment they have used thymol and tertrachlorethylene and prefer the latter (this *Bulletin*, v. 29, p. 756); and they use for detection of eggs the method described in the same paper. This section of the book contains many microphotographs of eggs and larvae of other parasites and of some free-living nematodes found in mines. The difficulty of disposal of faeces and of disinfecting a mine are pointed out; and for prophylaxis the main stress is laid on treatment, beginning with those persons most heavily infected. *Clayton Lane.*

CHOPRA (R. N.) [M.A., M.D. (Cantab.), Lt.-Col. I.M S., etc.]. **Indigenous Drugs of India. Their Medical and Economic Aspects.**—pp. xxii + 655. 1933. Calcutta: The Art Press, 20 British Indian Street. [Rs. 15/-].

Empirical investigation of the indigenous drugs of India began many centuries ago, but scientific investigation had to await the development of chemistry and physiology. Even after those sciences were well advanced the co-ordination of pharmacological analyses and physiological reactions with clinical results was hampered for many years by the absence in India of well-equipped laboratories and research hospitals in close association. This handicap has of late years been to a considerable extent lightened. The author of the present work, as Professor of Pharmacology in the Calcutta School of Tropical Medicine and as a Physician to the Carmichael Hospital for Tropical Diseases, has both laboratories and clinical material at his disposal and has made good use of his opportunities.

The present work is an expansion of a course of lectures delivered by Lieut.-Col. Chopra as Sukhraj Ray Reader in Natural Science at Patna University during 1929–30. The term "Indigenous" is not used *sensu stricto*, but includes a certain number of drugs derived from plants, such as Cinchona, Ipecacuanha and Hemp which it would be absurd to exclude from consideration merely because they are introductions into India.

The book is divided into five sections. The first discusses in interesting and informative fashion such topics as the history of Indian Materia Medica, the need for research in indigenous drugs, India's foreign trade in drugs, the cultivation of medicinal plants in India, the manufacture of standardized preparations from crude drugs produced in India, the use of crude drugs in certain cases in order to lower the cost of treatment and the adulteration of drugs which is so prevalent in India.

The second part is concerned with the actual and potential resources of India for the production of drugs recognized by official Pharmacopoeias. Two species of blister-beetles and over eighty species of plants are mentioned as occurring in India, although a few of these, such as *Erythroxylum Coca* (the source of Cocaine) and the various species of *Strophanthus*, have but slender credentials for admission. In this section the author refrains from overburdening his pages with botanical, chemical, pharmacological and therapeutic details, which, as he states, can be found in any of the standard works. Special attention is given on the other hand to the economic aspects of the production of such pharmacopoeial drugs in India, and as an instance of this, the author's well-balanced discussion of the problem of quinine production in India may be mentioned.

Part III deals with a selection from the vast number of drugs used by the practitioners of the indigenous systems of medicine. The chemistry, pharmacology and therapeutic uses of the drugs derived from over fifty indigenous plants and a few of non-vegetable origin are described.

Part IV gives an alphabetical list of the botanical names of Indian medicinal plants, an amazing multitude of over 2,000 species, with their Natural Families, more common Indian names and uses with references to literature. Similar but less-detailed lists follow of inorganic and animal products, of plants used in snake bite and scorpion sting—which remedies the author dismisses as useless.

Part V consists of a list of the common bazaar medicines of India, mostly derived from plants, arranged alphabetically under the scientific names of the plants. Under each are given the vernacular names and notes regarding the plant, its distribution, uses and parts used. This is followed by an index of common vernacular names and a general index to the volume.

A considerable amount of original pharmacological work and clinical observations is embodied in the work and, taking it as a whole, it may be pronounced the best book in a moderate compass on the subject that has yet appeared. It is well printed and well produced. *A. T. Gage.*

THOMPSON (C. J. S.) [M.B.E., etc.]. **A Compendium of the Pharmacopoeias and Formularies (Official and Unofficial) with Practical Aids to Prescribing and Dispensing.** 7th Edition.—pp. ix+381. 1933. London: John Bale, Sons & Danielsson, Ltd., 83–91 Great Titchfield Street, W.1. [10s. 6d.]

The fact that this work has reached a seventh edition is clear evidence of its usefulness. Though handy in size—it can easily fit into the pocket—it contains a vast amount of information. A list of modern remedies, both official and non-official, is given with brief notes of dosage and use, and synopses of the recent British Pharmacopoeia and those of the United States, continental and other foreign countries. Many helpful prescriptions and formulae for medical purposes are to be found and even those of toilet preparations. Other sections deal with modes of preparing the invalid foods in common use, the methods of milk analysis and detection of preservatives, incompatibility, poisons and their antidotes. There are various tables of weights, measures, temperatures and their equivalents, obstetric calculation, posological index and a list of the Latin terms found in prescriptions, with their meanings and the equivalent phrases in French, German, Italian, Spanish and Dutch. In the reviewer's opinion undue prominence would seem to be given to the Latin terms, in fact some of the concords so called would bring trouble to Smith minor; moreover, many if not most of the terms mentioned are rarely if ever used in Latin, now that the public are less ready to be mystified than they were fifty years ago. How many practitioners of the present day would know, or bother to remember the English equivalents of Lagena obturata, Quant. fab., Quant. mic. pan. or Scrob. cord.? These conundrums, however, occupy less than ten pages, and the book as a whole is admirable, and after testing it in the usual way by looking first for the commoner things and later for more out-of-the-way matters, we have so far not found it wanting and therefore heartily recommend it not only for the home practitioner but also for those abroad, district medical officers for example to whom such a work would frequently offer a helpful suggestion. *H. H. S.*

JOHANNESSOHN (Fritz) [Dr. Med.]. **Chinin in der Allgemeinpraxis unter Berücksichtigung pharmakologischer Befunde. Ein Nachtrag zu der 1930 Erschienenen Ausgabe.** [Quinine in General Practice with Special Reference to Pharmacological Findings. An Appendix.]—176 pp. 1932. Amsterdam–W. Bureau tot Bevordering van het Kinine-Gebruik.

In 1930 the author published a work in which the use of quinine chiefly in conditions other than malaria was reviewed. In this appendix some 400 further publications are considered. It deals with the history of cinchona bark and quinine, the chemistry of quinine, its distribution in the body and excretion and (pp. 32–108) its therapeutic application in a great variety of conditions but not malaria; in shorter sections are considered diagnosis, toxic effects, dosage and quinidine. The book is well indexed, and appears to be a useful compilation. *A. G. B.*

SOCIÉTÉ DES NATIONS. ORGANISATION D'HYGIÈNE. **Paludisme dans les Deltas. Delta de l'Ebre** [PITTALUGA et al.]. **Delta du Danube** [ZOTTA (G.)]. [Malaria in the Deltas of the Ebro and Danube.] —176 pp. With illustrations. 1932. Sept. Genève. [C. H. Malaria/179].

This work bearing the superscription of the League of Nations was published in the *Archives Roumaines Pathologie Expérimentale et Microbiologie*. It was noticed in this *Bulletin* in February (No. 2. pp. 62–3). *A. G. B.*

We record with great regret the death of Lt.-Colonel A. W. ALCOCK, F.R.S. Colonel ALCOCK became Sectional Editor in 1919 and Assistant Director (half-time) in 1921. In 1925, when a whole-time Assistant Director was required, Colonel ALCOCK continued his work as Sectional Editor till he resigned on grounds of health in November, 1932. He will be sadly missed by the discerning reader of this *Bulletin*. Of him it may be truly said: Nihil quod tetigit non ornavit.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 30.] 1933. [No. 5.

RECENT KNOWLEDGE CONCERNING YELLOW FEVER.

A Report prepared by the Yellow Fever Commission of the *Office International d'Hygiène publique.**

I.—Clinical Diagnosis.

The difficulty of diagnosing yellow fever among the native inhabitants of a suspected area is emphasized by all recent observers. The highly virulent " Asibi " strain of the virus was obtained from an African patient who had only slight fever, headache and pain in the back, and whose urine contained only a trace of albumin on the second day of the attack and none later. The " French " strain was also obtained from a patient (a Syrian at Dakar) with a mild attack. BEEUWKES, BAUER and MAHAFFY,[1] during an inquiry into yellow fever endemicity in West Africa, proved by means of " protection tests " the existence of yellow fever in several large towns but were quite unsuccessful in identifying actual cases of the disease among the native population. They concluded that it is not possible at present to diagnose clinically the mild cases which, it is presumed, are constantly occurring among the indigenous inhabitants. One of the difficulties which they reported was that almost 100 per cent. of the native children harboured malaria parasites and over 50 per cent. were infected with schistosomiasis accompanied by albuminuria. Diseases accompanied by jaundice are also frequently confused with yellow fever, as happened at Guayaquil in 1918 and in the recent epidemic at Rio de Janeiro. In both places cases of Weil's disease were present along with, and were diagnosed as, yellow fever.[2] Moreover, as reported by BEEUWKES,

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* The Report was presented to the Permanent Committee of the Office International d'Hygiène Publique by Lieut.-Colonel S. P. James, adviser on Tropical Diseases to the Ministry of Health, London, and President of the Commission. It was adopted by the Committee at its Plenary Session of October 22nd, 1932, and published in French in the *Bulletin Office International d'Hygiène publique*, Vol. 25, January, 1933.

[1] BEEUWKES (H.), BAUER (J. H.) & MAHAFFY (A. F.). *Amer. Jl. Trop. Med.* 1930. Vol. 10. pp. 305–333. [This *Bulletin*, 1931, Vol. 28, p. 283.]

[2] SAWYER (W. A.), KITCHEN (S. F.), FROBISHER, Jr. (M.) & LLOYD (Wray). *Jl. Experim. Med.* 1930. Vol. 51. pp. 493–517. [This *Bulletin*, 1930, Vol. 27, p. 487.]

WALCOTT and KUMM,[3] an unnamed disease associated with jaundice and with a symptomatology suggestive in some respects of yellow fever, is widespread in Nigeria and other parts of West Africa. Finally must be mentioned the difficulty which arises so frequently in distinguishing between yellow fever and malaria under its various forms.[4]

On the other hand the result of recent unpublished observations by Dr. BEEUWKES establishes the possibility of diagnosing yellow fever clinically in the native. He will shortly publish the clinical records of more than 100 cases of this kind.

At the Conference on Yellow Fever held at Dakar in 1928, it was proposed by Inspector-General LASNET[5] that during periods when it is suspected that cases of yellow fever are occurring but cannot be definitely identified, the term "prophylactic diagnosis" should be introduced and officially recognised.

It is particularly important to make use of this "prophylactic diagnosis" on each occasion that a sick person is found, in an endemic or epidemic region, suffering from fever accompanied by an early albuminuria.

II.—Laboratory Diagnosis.

It was discovered by STOKES, BAUER and HUDSON[6] in 1927–28 that blood from yellow fever patients in the first three days of the illness is capable of communicating the disease to *Macacus rhesus* inoculated with it and that the procedure enables a diagnosis of yellow fever to be made in very mild cases not recognizable clinically. As the blood retains its infectivity *in vitro* for many days, samples from suspected cases can be sent for diagnosis to a central laboratory situated in a region where the disease cannot spread. It was proposed by Dr. A. W. SELLARDS at the Conference on Yellow Fever held at Dakar in April, 1928, that Governments should make laboratory arrangements for this diagnostic service. Possible risks of spread from the laboratories concerned have caused some countries where yellow fever has never existed, but where the mosquito vector is abundant, to object to introducing this procedure which, moreover, is expensive and is not applicable after the fourth day of the attack. Discussions on the subject are reported in the Procès-Verbaux of the Sessions of the Committee of the Office International d'Hygiène Publique for October, 1929, pp. 92 and 228, May 1930, p. 117 and May 1931, pp. 53 and 88 and in a paper by Professor SCHÜFFNER[7] of Amsterdam. The Governments of India, the Dutch East Indies and the Belgian Congo have made regulations under which it is forbidden to introduce, or to work with, material containing, or suspected to contain, the virus of yellow fever in any form.

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[3] BEEUWKES (H.), WALCOTT (A. M.) & KUMM (H. W.). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Vol. 24. pp. 429–451. [This *Bulletin*, 1931, Vol. 28, p. 858.]

[4] JORGE (Ricardo). *Bull. Office Internat. d'Hyg. Publique.* 1931. Vol. 23. pp. 682–692. [This *Bulletin*, 1931, Vol. 28, p. 997.]

[5] LASNET. *African Conference on Yellow Fever* (*Dakar—April 1928*). p. 31. [This *Bulletin*, 1929, Vol. 26, p. 602.]

[6] STOKES (A.), BAUER (J. H.) & HUDSON (N. P.). *Amer. Jl. Trop. Med.* 1928. Vol. 8. pp. 103–164. [This *Bulletin*, 1928, Vol. 25, p. 538.]

[7] SCHÜFFNER (W.). *Klin. Woch.* 1932. Vol. 11. pp. 753–757. [This *Bulletin*, 1932, Vol. 29, p. 578.]

III.—Diagnosis after recovery from an attack by "the protection tests."

A laboratory test is now available by which it can be ascertained whether a person has had yellow fever in the past. It is based on the discovery[8] that the blood serum of persons who have suffered from yellow fever, however long ago or in however mild a form, possesses the property of protecting *Macacus rhesus* from the effects of inoculation with yellow fever virus. The dose of serum (5 cc.) is injected intraperitoneally into the monkey and four hours later the dose of virus (1 cc. of a 1 in 10 dilution of blood from an infected monkey at the onset of fever) is injected subcutaneously. Two animals are used in testing each specimen of serum against a uniform dose of virus, the results being interpreted as indicating clearly that a person has had yellow fever only when his serum protects both animals used for the test. The procedure is called "the protection tests in monkeys."

In July 1930 Dr. THEILER[9] of the Harvard Medical School announced the discovery that white mice can be infected with the yellow fever virus if the inoculation is done intracerebrally. The disease produced is not yellow fever, it is an encephalitis, but yellow fever of the usual type is again reproduced when monkeys are inoculated with the brain tissue of infected mice. Repeated passage of the virus through mice produces a "fixed virus" which kills all mice on the fifth day after intracerebral inoculation. Death is prevented when serum from a recovered yellow fever patient is injected into the brain along with the virus. This is called "the intracerebral protection test in mice."

With the object of making the test more sensitive SAWYER and LLOYD[10] modified it by injecting the virus into the peritoneal cavity and at the same time a mild irritant into the brain to localize the virus there. The irritant used is 0·03 cc. of a solution containing 2 per cent. starch and 0·9 per cent. sodium chloride; the virus is a 20 per cent. suspension (not centrifuged) of the brain tissue of infected mice. In employing the test for ascertaining whether persons have had yellow fever in the past, the mice are used in groups of six. The starch solution is injected intracranially and then the mixture of virus (0·2 cc.) and serum (0·4 cc) intraperitoneally. Observation is for 14 days. If the serum is from a true case of yellow fever all the mice should survive, while all the controls (without serum) should die. This modified method is called "the intraperitoneal protection test in mice."

IV.—Reliability of the protection tests.

The reliance which can be placed on a positive result with the protection test as evidence that a person has suffered from yellow fever in the past has been enquired into by several workers, particularly HUGHES and SAWYER[11] and other representatives of the International Health Division working in New York and at Bahia in Brazil. The results of some of the tests conducted for that purpose in regions where yellow fever has never occurred are reported in the following section. HUGHES and SAWYER after discussing fully all possible causes of error in the intraperitoneal mouse protection test write as follows: "Although mistakes due to the presence of physiological protective substances or to the loss of specific antibodies with the passage of time, probably do occur in rare individual instances, and although other mistakes may arise through errors of technique, or the use of unsuitable animals, we are convinced that with reasonable care the test is remarkably specific and reliable, and that a positive result is strong evidence that the donor of the serum has previously been infected with the virus of yellow fever." Dr. F. F. RUSSELL, Director of the International Health Division, Rockefeller Foundation, in commenting on the subject for the information of the Yellow Fever Commission, writes as follows: "I can say that it is certainly not obligatory to conclude that any person whose blood serum showed any degree of protective power in the test with mice has previously been infected with yellow fever virus. Neither the test nor those who apply it are infallible. On the other hand, I consider a definite positive result very strong evidence in favour of previous infection with the virus. When groups of persons are studied, rare 'non-specific reactions' become of less importance and the tests give information of great value in epidemiological studies."

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[8] BEEUWKES, BAUER & MAHAFFY. See reference[1] on p. 265.

[9] THEILER (M.). *Ann. Trop. Med. & Parasit.* 1930. Vol. 24. No. 2. pp. 249–272. [This *Bulletin*, 1930, Vol. 27, p. 872.]

[10] SAWYER (W. A.) & LLOYD (Wray). *Jl. Experim. Med.* 1931. Vol. 54. pp. 533–555. [This *Bulletin*, 1932, Vol. 29, p. 198.]

[11] HUGHES (T. P.) & SAWYER (W. A.). *Jl. Amer. Med Assoc.* 1932. Sept. 17. Vol. 99. pp. 978–981. [This *Bulletin*, 1933, Vol. 30, p. 2.]

V.—Application of the protection tests for epidemiological studies.

In 1929 the Rockefeller Yellow Fever Commission in West Africa began to utilize the "monkey protection test" to secure information concerning the past distribution of yellow fever in that country. That test has since been largely replaced by the "intraperitoneal test in mice." This mouse test enables many more observations to be made and it is also claimed that it eliminates an error arising from the observation that occasionally, when using the monkey test, a monkey possessing a natural resistance to the yellow fever virus is among the test animals used. This cannot happen in the mouse test because it is the practice to use only particular strains of mice whose susceptibility to the virus is known.[12]

The purposes for which the test is applicable are stated by SAWYER and Wray LLOYD to be: (1) to determine whether yellow fever has been present in a region within the life of the present generation and to estimate the period at which the infection occurred and its extent; (2) to map large areas with regard to endemicity, epidemicity or absence of yellow fever and so to decide where control measures are necessary; (3) to identify the occurrence of yellow fever in areas where the disease is believed to be present but is seldom or never recognized; (4) to determine whether persons vaccinated against yellow fever by any proposed method have in fact been rendered immune.

An important practical application of the test at the present time is in connexion with endeavours to search out and define the latent endemic foci of yellow fever in areas through which aerial traffic may shortly be established. In October 1930, the Office International d'Hygiène Publique resolved to draw the attention of Governments to this important question and to request the Rockefeller Foundation to undertake the technical direction and organization of any enquiries which might be initiated. On the 17th April 1931 a reply was received from the Foundation stating that every possible assistance would be given to the Office in connexion with the enquiries and offering (1) to train medical officers of the colonial services in the methods of performing protection tests ; (2) to examine in their laboratory at New York any specimens which colonial medical officers might collect. The President of the Office International d'Hygiène Publique brought these arrangements to the notice of interested Governments in a letter dated 18th June 1931. Effect is being given to them by several colonial Governments.

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[12] SAWYER & LLOYD. See reference[10] on p. 267.

VI.—Protection test results.

By way of examples and without discussion of the conclusions to be drawn from them (which will be considered in the next section) the following is a brief record of the results of some protection tests :

Africa.

The first investigations by means of the protection tests were made in Nigeria and in Sierra Leone by the Yellow Fever Commission of the Rockefeller Foundation in West Africa. The examples which follow are given only to show the varying rates obtained in different parts of the country more or less affected by yellow fever.

BEEUWKES, BAUER and MAHAFFY[13] of the Rockefeller Yellow Fever Commission in West Africa summarized as shown in the table the results which they obtained, employing the monkey protection test, in the first survey in Africa in 1929.

Towns	Total number of specimens tested	Number of sera which protected both animals	Number of sera which showed no protection	Number of sera with which only one animal died
1. *South-western Nigeria.*				
Ibadan	100	32	50	18
Ilorin	25	6	10	9
Total	125	38	60	27
2. *Northern Nigeria.*				
Bauchi	36	—	35	1
Zaria	29	—	27	2
Kano	25	1	21	3
Total	90	1	83	6
3. Ife, after an epidemic of yellow fever ...	25	17	6	2
4. Freetown. No yellow fever reported since 1910	34	1	30	3

In Ibadan (protection index 32 per cent.) four clinical cases of yellow fever were observed in 1925, but in Ilorin (protection index 25 per cent.) yellow fever had never been reported. In Ife (protection index 68 per cent.) there was an epidemic in 1928, eighteen cases being observed. Bauchi, Zaria and Kano were selected as representing localities where a condition of endemicity could be definitely excluded. The results (protection index 0 in Bauchi and Zaria, 4 in Kano) were strikingly different from those of towns in what was presumed to be the endemic area. In Freetown, where epidemics of yellow fever used to be frequent, no clinical case had been observed since 1910 and the low protection index (3 per cent.) indicated that there is now very little, if any, risk of infection there. The contrast between recent and past history of yellow fever in this place was regarded as a striking demonstration of the value of piped water-supply and other sanitary measures in the control of the disease.

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[13] BEEUWKES, BAUER & MAHAFFY. See reference[1] on p. 265.

A few of the results of further tests by the same workers in Nigeria were reported in a paper by Dr. JOHNSON[14], the Director of Medical Services, in 1932, as follows: Kaduna township 2 per cent.; neighbouring pagan villages 83 per cent.; Hausa villages 29 per cent.; Gumel, a town on the northern border, 60 per cent. among adults, 44 per cent. among children; Sokoto, a town in the north-west, 0 per cent.

Since then many other results of protection tests in Nigeria have become available and it is considered that the enquiry in this country is almost finished. Dr. BEEUWKES is now engaged in analysing all these results and in preparing a map showing their distribution. He hopes to be able to determine from the analysis the value of the test in determining the incidence of yellow fever in Nigeria and will place his studies at the disposal of the Yellow Fever Commission.

Similar investigations have been commenced and are now being conducted in the Gold Coast, and in different French Colonies, *e.g.*, Senegal, Soudan, Haute Volta, the Ivory Coast, Guinea and Dahomey. It is hoped shortly to extend the enquiries to French Equatorial Africa, the Belgian Congo, and Angola.

Central America.

Panama[15].—Col. J. F. SILER, Chief Health Officer, Panama Canal Zone and Dr. L. B. BATES collected serum from 96 persons of ages ranging from 5 years to 85 years. The sera were tested in the Rockefeller Yellow Fever Laboratory, New York. Of 55 sera from persons under 29 years of age 52 gave no protection and the result in the remaining 3 was inconclusive. Of 41 sera from persons between 30 and 85 years of age 14 gave complete protection, 25 gave no protection and the result in the remaining 2 was inconclusive. Thus all the sera which gave protection were from persons old enough to have been infected before 1905 when the last known clinical case was observed.

North America.[15]

Negroes residing in Maryland.—Of 61 sera collected from adults, 57 gave no protection and the results in 4 were inconclusive. On a retest, two gave no protection, one was reported as inconclusive, the other as unsatisfactory.

Canada.[15]

Of 122 sera from persons who had either never been out of Canada or had not visited a country where yellow fever existed, all except three gave no protection. Of these three, one gave protection in two of seven tests; each of the others gave protection in one of 5 or 6 successive tests.

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[14] JOHNSON (W. B.). *Brit. Med. Jl.* 1932. Aug. 13. pp. 285–288. [This *Bulletin*, 1933, Vol. 30, p. 1.]

Brazil.[15]

Representatives of the Rockefeller International Health Division in Brazil made a series of protection tests on the sera of persons residing in places which were believed never to have been infected with yellow fever. Of 105 sera from Friburgo 93 gave no protection and the result with the remaining 12 was inconclusive. All of 135 sera from Guape were without protective power.

China.[15]

HUGHES and SAWYER collected sera from 103 adult Chinese of Peiping and tested them in New York. No specimen gave protection.

British India.[15]

Sera from 92 Tamil and Telegu natives of Southern India were collected by Col. H. H. KING, I.M.S. and Major W. J. WEBSTER, I.M.S. and were examined at the Rockefeller Yellow Fever Laboratory in New York. No protection at all was given by 87 of the specimens but the remaining five seemed to show some protective power with one or other of the two tests. Two of these sera protected in both tests and in the second in a dilution of 1 in 10. The ages of these persons were respectively 40 years and 17 years. Their cases are to be studied further if it can be confirmed that they have never been outside India.

VII.—General inferences which it is justifiable to draw from the results of protection tests.

In the opinion of most workers, the reliability of the protection test as evidence of antecedent yellow fever is no longer in doubt, but sufficient information is not yet available for a complete statement of the epidemiological inferences which it is justifiable to draw from available results in different regions. It is plain, of course, that no difficulty arises in interpreting the results of examples such as those relating to China, Canada, North America and some regions in Brazil recorded in the preceding section ; clearly the meaning is that yellow fever has not occurred in those regions within the history of the present generation. Also there can be no question that the results of the test in Panama and in Freetown mean that the risk of yellow fever infection disappeared from Panama about 27 years ago and from Freetown about 20 years ago. But it is not so easy to interpret results from regions where the question for decision is whether the disease is constantly present in endemic form, or occurs only as intermittent epidemics. Dr. RUSSELL has stated the difficulty clearly in informing the Yellow Fever Commission that " a recent epidemic in a highly susceptible community, or two or three epidemics at rather long intervals, might give the same percentage of immunes as would be caused if the infection were constantly present in a community large enough to permit the disease to persist continuously." Epidemiologically and for the purposes of control and prevention it is important to know whether localities are in the former or in the latter category. The problem has arisen in respect of various localities in Nigeria where protection test surveys on a large scale have recently given positive results in localities widely separated from one another and with widely differing climatic conditions. It would be incorrect to class all these localities as " endemic foci " or to consider that there is, necessarily, a risk of contracting yellow fever in them. What has next to be done is to supplement the indication of past infection afforded by the results of the protection test survey by intensive local enquiry into the several factors on which permanent endemicity depends. Perhaps, as Dr. RUSSELL has hinted in his informative and highly valued letter to the Commission, it may be the case that the " *veritable endemic foci* " *of yellow fever are fewer and more circumscribed than is sometimes supposed, but that the centres liable to the occurrence of epidemics of brief duration are more numerous and cover a wider geographical range. It is desirable that the difference should be emphasized in order to correct the alarm caused by loose statements indicating without qualification, that yellow fever is exceedingly widely distributed in West Africa."*

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[15] Communication to the Office International d'Hygiène Publique by Dr. F. F. RUSSELL, Director, International Health Division, Rockefeller Foundation, New York, U.S.A. See also HUGHES & SAWYER, reference[11] on p. 267.

Information is not yet sufficient for a decision on the significance which should be attached to occasional positive results of the protection test in individuals who, so far as is known, have not had yellow fever or have not resided in an area where the disease occurs. The two instances among the 92 specimens of serum from Tamil and Telegu natives of Southern India have already been mentioned. It was considered that the protective power of the sera of these two persons was too high to justify their classification in the category of " false positives " due to the rare physiological property possessed by some sera of showing a weak natural protective power. Further enquiry is to be made into these cases and tests are to be performed with the sera of persons from the same region who have had dengue and other diseases. The same will be done if occasional instances of " non-specific immunity " are discovered during the course of protection test surveys in East Africa. It is understood that Prof. SNYDERS[16] of Amsterdam has in train a series of protective tests with the sera of persons who voluntarily submitted themselves to infection with dengue fever for the purposes of the test. An important contribution to this question was recently reported by Dr. STEPHANOPOULO to the first International Congress of Mediterranean Hygiene at Marseilles. Employing the intracerebral protection test with mice he found the serum of 11 persons who were known to have had dengue in the course of the recent epidemic in Greece possessed no protecting power against yellow fever. Moreover Dr. BEEUWKES employing the intraperitoneal test with mice obtained the same negative result with the sera of 24 persons collected by Dr. BALFOUR at Athens, who had had dengue during the above-mentioned epidemic.

VIII.—Relative susceptibility of different races.

Some individuals suffer very lightly from yellow fever, others very severely. This applies to Europeans as well as to the indigenous inhabitants of epidemic areas, but apparently not to the same extent. In the course of protection test surveys it happens only very rarely that a European is found whose serum has a high protective power without any history or recollection of a previous illness suggestive of yellow fever. West African negroes, on the other hand, although they are susceptible to infection and sometimes show characteristic symptoms, rarely die from the disease and seem as a general rule to have it in so mild a form that clinically it is not recognizable.[17] It has been suggested that possibly cases not recognizable clinically may be a general rule among other races of mankind, and it has been asked whether, for example, any clinical case of yellow fever has been known to occur in a native of British India resident in Africa. Probably the number of natives of India who have been exposed to the infection of yellow fever in Africa is too few to render a negative reply significant, but it is certain that Indians residing in other parts of the world where yellow fever occurs have contracted this disease. There is evidence of this in a report by Dr. P. C. FLU[18] on observations made during the 1908–9 epidemic of yellow fever in Paramaribo (Dutch Guiana) as well as in a publication by Daniel BLAIR on Yellow Fever in British Guiana.[19] On the general question of relative racial susceptibility Dr. RUSSELL has kindly collected the following information and opinions :

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[16] Communicated by Prof. W. SCHÜFFNER. *Brit. Med. Jl.* 1932. Aug. 13. p. 325.

(1) Dr. Henry G. CARTER,[20] on p. 270 of his monograph on yellow fever published in 1931 says : "The African negro contracts yellow fever, so far as we know, as readily as other races, but has it more mildly and rarely dies of it.* His reaction to yellow fever is just what one would expect to have been evolved in a race for many generations subject to that infection, No other known race shows this reaction—certainly not the American Indian."

(2) It has been noted repeatedly that the Indians of Central Africa and Mexico, of Ecuador and of Peru, are just as susceptible to the disease, and that they have it in just as severe a form, as the white races.

(3) Colonel Joseph F. SILER, Chief Health Officer, Panama Canal Zone, has ascertained that among 21 deaths of Chinese employees of the French Company recorded in 1887, one was stated to be due to yellow fever; it is thought that 1887 was the only year in which the French Company employed Chinese labourers. From an examination of the records for 1904–5 among Canal Zone employees under the American administration, Col. Siler found descriptions of 6 cases of yellow fever (with one death) among Japanese labourers and mess stewards. The Diagnostic Board confirmed the diagnosis in each case.

(4) In a statistical report on yellow fever in the Province of Pacasmayo in Peru during 1921 seven cases of the disease among Japanese with three deaths are described.

(5) A report has been received of a fatal case of yellow fever in a Chinaman from Para, Brazil, on March 6th 1929. The clinical history and post-mortem findings were characteristic.

Dr. RUSSELL expressed the opinion that, although these examples are few in number, the evidence is sufficient to conclude that Japanese and Chinese contract yellow fever and die from it in about the same proportion as European races. There is thus no race which can be considered to be less liable to yellow fever than another. Observations made during the recent epidemic in Rio de Janeiro, however, have indicated that in South America black races are attacked much less frequently than white races. Further research on this question is desirable.[21]

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* Nevertheless, according to a report by Professor Ricardo JORGE[21] it was observed in the Belgian Congo during the epidemic of 1927–8 that the mortality among the natives attacked was as high as that of the European cases.

[17] DUPONT. *Rev. Méd. et Hyg. Trop.* 1928. May–June. Vol. 20. pp. 65–79. [This *Bulletin*, 1928, Vol. 25, p. 844.]

[18] FLU (P. C.). *Zeitsch. f. Hyg.* 1909. Vol. 65. pp. 17–54.

[19] BLAIR (Daniel). Report on the first 18 months of the 4th Yellow Fever Epidemic in British Guiana (1856).

[20] CARTER (H. R.). The Early History of Yellow Fever. 1931. Baltimore: Williams & Wilkins Co. [This *Bulletin*, 1932, Vol. 29, p. 245.]

IX.—" Residential Immunity " (Immunité de Séjour).

It is a common belief that Europeans who reside a long time in an epidemic area of yellow fever become relatively free from the likelihood of contracting the disease. Observations on the belief are contradictory, but it has been proved by BEEUWKES and others that the failure to become infected (" immunity ") (if it exists) is not due to the presence of antibodies in the blood, for examinations by the protection test of sera from 25 persons who resided on an average 17 years in Nigeria showed that none possessed any protecting power.

X.—The use of vaccines and sera.

Workers in several countries have endeavoured to apply to yellow fever one or other of the four methods of immunization which has been tried more or less successfully in other virus diseases, namely :—

(1) Inoculation with immune serum ;
(2) Inoculation with a vaccine containing killed or attenuated serum ;
(3) Inoculation with a mixture of virus and immune serum ;
(4) Inoculation with a biologically modified virus.

The injection of convalescent serum from a recovered case of yellow fever protects against the result of an infection but the duration of protection is not thought to exceed three weeks or a month. Little or no success has been obtained with vaccines containing killed or attenuated virus and at present the inoculation which seems likely to give the best results is one comprising the simultaneous injection of a biologically modified mouse-virus strain and immune serum. FINDLAY and HINDLE[22] and other investigators were successful in producing a lasting immunity in monkeys by the simultaneous injection of immune serum and living virus, but the risk of accidental injections of laboratory workers with the virulent strains of virus maintained in monkeys led to the substitution, for immunizing purposes, of the less dangerous strain which was established in mice by THEILER. This is a biologically modified type of the " French " strain which after 100 successive passages through mice has lost its power to kill monkeys on subcutaneous inoculation. SAWYER, KITCHEN and Wray LLOYD[23] report that the vaccine is prepared in two parts : (1) A 10 per cent. suspension of mouse-brain tissue containing the virus is prepared in fresh, sterile, human immune serum and is tested for sterility and centrifuged. The supernatant fluid is passed through Seitz or Berkefeld N filters, collected in tubes, each containing 1 cc., and dried in the frozen state. (2) Immune serum is obtained from persons recently recovered from yellow fever and 0·2 per cent. of tricresol is added to the pooled serum from several persons. For use, the dried serum is dissolved and brought to the original volume (1 cc.) with distilled water. The amount injected is 0·03 cc. per kilogram of body weight. In practice the immune serum is injected subcutaneously in two different places in the abdominal wall and immediately afterwards the dissolved vaccine is injected in the same way. The amount of immune serum injected (including the small part which is in the vaccine) is 0·3 cc. per kilogram of body weight. Protective power against yellow fever virus appeared in the serum of one vaccinated person on the seventh day, in 2 on the ninth day, in 6 between the twelfth and fourteenth day and in 1 on the twenty-first day. On the invitation of the International Health Division, Rockefeller Foundation, the British Colonial Office has recently deputed Dr. G. M. FINDLAY to study the mode of preparation of this vaccine and its practical application in the Yellow Fever Laboratory, New York.

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[21] JORGE (R.). *Bull. Office Internat. d'Hyg. Publique.* 1930. Vol. 22. pp. 1481–1493. [This *Bulletin*, 1931, Vol. 28, p. 281.]

[22] FINDLAY (G. M.) & HINDLE (E.). *British Med. Jl.* 1931. May 2. pp. 740–742. [This *Bulletin*, 1932, Vol. 29, p. 201.]

[23] SAWYER (W. A.), KITCHEN (S. F.) & LLOYD (Wray). *Proc. Soc. Experim. Biol. & Med.* 1931. Vol. 29. pp. 62–64. [This *Bulletin*, 1932, Vol. 29, p. 572.]

XI.—Prevention and Control.

The work now being conducted at the Yellow Fever Laboratory of the Rockefeller Foundation, New York, with a view to the production of a prophylactic vaccine which will confer a lasting immunity on inoculated persons seems to foreshadow a highly important event in the history of yellow fever research. The procedure now being tested has been already mentioned in section X as being devised by SAWYER, KITCHEN and Wray LLOYD. It is being applied experimentally for the protection of laboratory personnel and field workers exposed to yellow fever infection[24] and it is understood that the next step may be the vaccination of European members of the Colonial Civil and Military Services whose duties take them to countries where there is a risk of contracting the disease. A practical application which would do more than anything else to allay existing fears of the risk of spread of yellow fever by aerial traffic would be to require the vaccination of all aircraft crews and of passengers from infected areas to uninfected (but infectible) areas. There may be difficulties in preparing sufficient quantities of the vaccine for general use in endemic centres because one of the ingredients is human serum from recovered cases of yellow fever, but effective vaccination applied even on a small scale would materially assist the natural cessation of epidemic spread which comes about as, CARTER showed many years ago, by "failure of the human host."[25] Every person who becomes immune as a result of an attack of the disease remains for the rest of his life incapable of having an attack and incapable of helping to spread infection. The duration of immunity produced by the new method of vaccination is not yet known.

Besides the prospect of obtaining an effective prophylactic vaccine, recent research has added greatly to the means at disposal for the control and prevention of yellow fever. In particular there is no longer any reason or excuse to neglect to notify cases, on the ground of differences of opinion about diagnosis of the kind reported in detail by Sir Rubert BOYCE in his book on yellow fever published in 1911. It can now be decided definitely by laboratory methods whether an illness of doubtful nature is due to yellow fever or not and if a positive result is obtained by the application of the procedure to one or two suspicious cases at the beginning of an outbreak, quick and complete notification of all subsequent cases would follow as a matter of course. The precision with which, by the application of the protection test, areas subject to yellow fever can be ascertained and their limits defined, is also noteworthy in relation to the control of the disease and to its avoidance when new routes through a country are being planned. In West Africa the results of "protection test surveys" have shown, not, as was formerly believed, that throughout the country the native is as saturated with yellow fever as with malaria,[26] but that there are areas where the disease has never existed, others where it existed formerly but has been entirely absent for ten or more years, and that even where the disease is constantly present in endemic form, or occurs intermittently in epidemic form, by no means all the inhabitants become infected. If positive results of protection tests are followed by up intensive local investigation and appropriate action, a great step will have been taken in reducing the present geographical distribution of the disease. For it can be said of yellow fever, as it cannot be said of malaria or of plague or of any other insect-borne disease, that if there is adequate knowledge of where and when the disease occurs there is little or no difficulty in getting rid of it. With precise information on this matter yellow fever is easier to control than is any other infectious disease, as was emphasized by several experienced sanitarians at the discussion on the subject held during the Centenary Meeting of the British Medical Association in July 1932.[27] It is important to recognize in this connexion that although on theoretical grounds some of the new knowledge acquired by study of the experimental disease in susceptible animals and mosquitoes seems to indicate that the risks of spread and the difficulties of control may be greater than was known, none of the fundamental observations which constitute the basis of successful public health action has been disturbed. During the last thirty years it has been repeatedly proved in practice that control and elimination can be successfully and speedily accomplished if action is taken in accordance with the basic observations that yellow fever is transmitted only from actual human cases in the first three days of the attack, that the incubation period of new cases does not exceed six days, that the agent of transmission is a domestic mosquito which remains in, or in the immediate vicinity of, the house where it has fed, [illegible] the insect, after feeding upon an infected case must surviv[illegible] days or more before it can transmit the virus to another [illegible] good deal has been written lately about the wide "range [illegible] and power of flight of the yellow fever mosquito as estima[illegible] experiments[29] under artificial conditions, but for the purposes of practical sanitation it is more important to know that yellow fever has never been conveyed by mosquitoes many yards from an infected house. The late Senior Surgeon H. R. CARTER, whose epidemiological experience of yellow fever was unrivalled, wrote on this point: "I think it is fair to say that yellow fever will rarely be conveyed by mosquitos 100 yards. Surgeon WHITE would put the limit far below this, but I believe that it is quite frequently conveyed by mosquitos across the street or to a house at the back of the infected house. There are two cases, one reported by MELIER, the other by myself, in which it seems to have been conveyed much farther: in the first, 225 metres, in the second, 152 yards. Possibly we were both mistaken and there were some other means of infection than those we accused. Seventy-five yards would be about as far as one would expect it to be conveyed."[80] Occasionally to recall in this manner the views of sanitarians who were actually engaged in dealing successfully with serious epidemics is a useful corrective to the modern tendency to require that measures for prevention and control should be devised to cover all possible risks indicated by recent laboratory results.

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[24] SAWYER (W. A.). *Southern Med. Jl.* 1932. Vol. 25. pp. 291–296.

[25] CARTER (H. R.). *Public Health Repts.* Washington. 1914. Sept. 11. Supplement No. 19. p. 14.

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[26] BOYCE (Rubert). Yellow Fever and Its Prevention. 1911.

[27] *British Med. Jl.* 1932. Aug. 13. p. 324.

[28] Communicated by Dr. ORENSTEIN. *Brit. Med. Jl.* 1932. Aug. 13. p. 325.

[29] SHANNON (R. C.) & DAVIS (N. C.). *Amer. Jl. Trop. Med.* 1930. Mar. Vol. 10. pp. 151–156.

It has been said that the yellow fever chapter of the *International Sanitary Convention for Aerial Navigation* is a concession to that alarmist point of view. Because our own Yellow Fever Commission was responsible for enunciating the principles on which this code of rules is based, we need not hesitate to admit that, short of forbidding aerial navigation entirely, no stricter rules could be prescribed. Sanitarians who, twenty years ago, had the task of preventing the spread of yellow fever from Panama and other infected ports, have said that the rules exceed the needs of the case. This may be true, but it is evidence that the provisions accord with the Permanent Committee's decision that in this International Convention, as in no other, sanitary safeguards must overrule all other considerations.

Novel departures from precedent are (1) that signatory countries where yellow fever may exist will not rest content to await the appearance of typical cases but agree to take steps for searching out unrecognizable cases of the disease by biological methods and, if it is present, for defining its geographical distribution; (2) that measures for preventing spread by aerial traffic shall be taken primarily before departure from areas where the disease exists and only secondarily at ports of arrival. Measures to be taken before departure include the requirement that crews and passengers shall have been free from any risk of infection during six days before embarkation and that the aircraft and cargo shall be free from the possibility of conveying mosquitoes. Equally unprecedented is the concession that countries which are not infected but are infectible may refuse to permit the entry of aircraft from infected countries provided that they report the reasons for the prohibition.

In view of the ease with which aerodromes can be kept free from yellow fever mosquitoes by measures not involving drainage or clearing of streams, swamps and ditches, as well as the rapidity with which aircraft can be cleared of these insects by spraying or other simple means, the practical risk of conveying infection by aerial navigation is concerned almost solely with the human case in the incubation period of the disease. Article 42 of the Sanitary Convention for Aerial Navigation prescribes the effective measures against this risk. 'Moreover it it should be found that personnel and intending passengers can be effectively immunized against the disease, the fears of countries menaced by yellow fever will be greatly allayed and it will be practicable to dispense with some of the provisions of the Convention which at present may, on occasion, interfere seriously with speedy travel.

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[80] CARTER. See reference[89], p. 273.

YELLOW FEVER: SOME RECENT ADVANCES.*

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During the past few years very important advances have been made in our knowledge of yellow fever, mainly owing to the discovery by STOKES, BAUER & HUDSON (1928) that the disease could be transmitted to monkeys (*Macacus rhesus* and *M. sinicus*). It was found that the disease could easily be maintained in these animals by the direct inoculation of infected blood or other tissues, or by the bites of infected mosquitoes, and the resulting possibility of laboratory investigations and detailed observations has been exploited to such a degree that more accurate knowledge has been obtained in all branches of the subject. In the present review attention is drawn to some of the more important recent advances, especially those of the last three years.

Distribution.

West Africa remains the most important endemic centre of the disease although there have been no very serious epidemics since the well-known outbreaks in Senegal and the Gold Coast in 1927. Nevertheless, isolated cases have been recorded each year and in 1931 there was a recrudescence of the disease in a number of scattered localities with no obvious connexion between them. During that year a total of 40 cases in Europeans was observed in six out of the nine French colonies in West Africa (*viz.*: Ivory Coast, Upper Volta, Soudan, Senegal, French Niger Territory, Mauritania), and in Togoland. Although the number of cases recorded was relatively small, a disquieting feature was their wide range, and especially the occurrence of cases as far inland as Garkidda, Nigeria, and Dosso, French Niger Territory (BOYÉ, 1932).

In South America, yellow fever reappeared during 1928 in Rio de Janeiro, with 125 recorded cases, 73 of them fatal. The following year a total of 613 cases were recorded, of whom 363 died (FRAGA, 1930). Although no further cases have been recorded from Rio since 1929, there has been an increase in the prevalence of the disease in South America during recent years, cases having been recorded from various other parts of Brazil and from Bolivia and Colombia. During 1931, 34 cases were recorded occurring in 13 different and widely scattered localities, ranging from the State of Rio in the south to Ceara in the north, and inland to Palma (League of Nations' Report—1931). The lack of connexion between these cases strongly suggests that the disease may persist for long periods without being revealed by epidemic outbreaks.

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* Dr. HINDLE's article was completed at the time that the Report of the Yellow Fever Commission became available. Written from different standpoints they supplement rather than duplicate one another. It was therefore decided to publish them together.

Endemicity, with special reference to protection tests.

It is well known that the blood of persons who have recovered from yellow fever will protect both monkeys and mice (see below) against yellow fever, and by the use of protection tests with the sera of natives from various suspected localities attempts have been made to delimit the endemic areas of the disease. The most important experiments of this nature have been carried out in Nigeria, where BEEUWKES, BAUER & MAHAFFY (1930) found that among sera collected at random from persons living in Ibadan and Ilorin 30·4 per cent. protected, and in Ife where an epidemic had recently occurred 68 per cent. of the sera (17 out of 25) gave protection. In Northern Nigeria, although earlier observations suggested the absence or rarity of the disease, later investigations have shown that even the dry northern regions are both infectible and able to maintain the infection throughout the year (see JOHNSON, 1932). Similar tests in French Niger and Dahomey gave 44 per cent. positive at Zinder among adults, negative in children; 48 per cent. positive at Tessaoua, and at Agadès all negative (DURIEUX, 1932). In South America protection tests or complement fixation tests have given similar results. SOPER, FROBISHER, KERR & DAVIS (1932) found that approximately 42 per cent. of sera from Magé, Rio de Janeiro, were positive, as compared with only 3 per cent. from Piracicaba lying outside the yellow fever zone.

The results of these protection tests in both West Africa and South America show that a large percentage of the inhabitants of endemic areas acquire immunity without any apparent attack of the disease and the impression that yellow fever has almost disappeared from the world is shown to be far too optimistic. It is evident that only a very small percentage of the cases of yellow fever are recognized as such, and the endemic regions of West Africa and South America remain a potential danger to the health of countries containing the transmitting mosquitoes and the necessary climatic factors.

Methods of Transmission.

Direct transmission.—Apart from the usual method of infection by the bites of infected mosquitoes, it has been shown beyond any question, that it is possible to acquire yellow fever through handling infected material. Two hospital infections occurred in patients who acquired the disease, one in making blood slides and performing a white cell count and the other in doing routine biochemistry on a specimen of human infected blood. It is recommended, in consequence, that gloves should always be worn when taking blood specimens in endemic areas, whether yellow fever is suspected or not (LOW & FAIRLEY, 1931). The large number of cases of laboratory infections, at least 35 in the last few years (see BERRY & KITCHEN, 1931) is another indication of the highly infectious nature of yellow fever virus, for in the great majority of these cases there is no definite evidence of the method of infection, beyond the possibility of contact with the blood or other tissues of infected monkeys.

Transmission by mosquitoes.—The incubation period elapsing before a mosquito becomes infective has been shown to depend mainly on the temperature (HINDLE, 1930). Ability to infect may be acquired after 4 days at 37°C., whilst at 21°C. 18 days is needed. When kept at 18°C. they were not infective after 30 days, but became infective when kept an additional 6 days at 23·4°C. (DAVIS, 1932). When

TABLE 1.

Summarizing the results of yellow fever transmission experiments with various species of insects other than *Aëdes aegypti*.

Species of mosquito	Locality of mosquito	Number of days since meal of infectious blood	Biting or Injection	Results	Authority
Aëdes luteocephalus	W. Africa	15–53	Biting	Efficient carrier	Bauer, 1928
A. stokesi *	„	18–33	„	„	„ „
A. apico-argenteus	„	17–30	Both	Negative	„ „
A. vittatus	„	11–39	„	Positive	Philip, 1929
A. africanus	„	12–21	„	„	„ „
A. simpsoni	„	19–43	„	„	„ „
A. irritans	„	"Adequate incubation period"	Injection	„	„ 1930b
A. nigricephalus	„	„	„	„	„ „
A. punctocostalis	„	„	„	„	„ „
A. scapularis **	Brazil	13–30	Both	„	Davis & Shannon, 1929
A. serratus	„	17–31	Injection	„	„ „
A. taeniorhynchus	„	16–23	Both	„	„ 1929 & 1931a
A. fluviatilis	„	15–19	„	Efficient carrier	„ 1931a
A. terrens	„	11–17	Injection	Positive	„ 1931b
A. fulvithorax	„	12–20	„	Negative	„ „
A. albopictus	Java	Various	Both	Positive but inefficient carrier	Dinger & Colleagues, 1929
Psorophora cingulata	Brazil	13–15	Injection	Positive	Davis & Shannon, 1931b
P. ferox	„	20	„	„	„ „
Eretmopodites chrysogaster	W. Africa	16–24	Both	„	Bauer, 1928
Trichoprosopon (Joblotia) digitata	Brazil	Various	Injection	Negative	Davis & Shannon, 1931b Kumm & Frobisher, 1932
Culex sp.?	Brazil	15–27	Biting	Negative	Marchoux & Simond, 1906
C. fatigans ? *quinquefasciatus*	„	20	„	„	„ „
C. quinquefasciatus	„	Various	Both	Doubtful	Davis & Shannon, 1929 & 1931b
C. thalassius	W. Africa	27–49	„	Positive	Kerr, 1932; Philip 1930b
Wyeomyia bromeliarum	Brazil	16–32	Injection	Negative	Davis & Shannon, 1931a
W. oblita	„	14–18	„	„	„
Limatus durhami	„	15	„	„	„
Mansonia fasciolata	„	14–21	„	Positive	„ 1931b
M. chrysonotum	„	14–15	„	„	„
M. albicosta	„	15	„	„	„
M. titillans	„	14–30	„	„	Kumm & Frobisher, 1932

* Referred to as *Aëdes apicoannulatus* in the original paper.

** MARCHOUX and SIMOND (1906) record negative feeding experiments with *C. confirmatus*, a synonym of this species.

TABLE I—*continued.*

Species of mosquito	Locality of mosquito	Number of days since meal of infectious blood	Biting or Injection	Results	Authority
M. uniformis ...	W. Africa	15–24	Injection	Positive	Kerr, 1932
M. (Taeniorhynchus) africanus	W. Africa	16 or more (in biting experiments)	Both	"	Philip, 1930a
Anopheles albitarsis ...	Brazil	12	"	Negative	Davis & Shannon, 1931b
A. tarsimaculatus ..	"	12–18	"	"	" "
A. gambiae	W. Africa	1–4	"	Positive	Philip, 1930a
Cimex lectularius .	Brazil	2–12	"	Faeces infective	Monteiro, 1929
C. hemipterus .	"	2	"	Positive but negative after 2nd day	Kumm & Frobisher, 1932
Triatoma megista . .	"	7	"	Doubtful	Davis & Shannon, 1931a

kept at lower temperatures (10°C.–15°C.) the virus persists in mosquitoes without their bite becoming infective, but if these insects are subsequently kept at temperatures above 20°C. they become infective. A mosquito that has become infective retains its infectivity by bite even if kept at temperatures of 10°C.–15°C. (HINDLE, 1930). SCHÜFFNER, DINGER & SNIJDERS (1930) found that lowering of temperature seemed to have some effect on the infectivity of the virus in *Aëdes aegypti*, for some which had kept at 16°C. failed to produce any fatal infections when allowed to feed on monkeys, but all these animals proved to be immune when subsequently inoculated with infective virus. HINDLE also showed that the simultaneous ingestion of a mixture of yellow fever virus and immune serum failed to produce infection in mosquitoes, and yet these same mixtures were infective when inoculated into monkeys. These results explain why in yellow fever the blood usually ceases to be infective to mosquitoes whilst virus is still present in the circulation (HUDSON & PHILIP, 1929). The ingestion of immune serum, however, has no effect on the infection once it has become established in the mosquito (DINGER, SCHÜFFNER, SNIJDERS & SWELLENGREBEL, 1929; HINDLE, 1930; DAVIS, 1932).

Hereditary transmission of the infection to the offspring of infected mosquitoes seems to have been definitely excluded, for in spite of numerous experiments, using very large numbers of infected mosquitoes, no case of such transmission has been obtained, although many observers have investigated this question. Another possible method of the infection being maintained in mosquitoes in the absence of a susceptible vertebrate host was suggested by ARAGÃO and LIMA (1929), who found that when infected female mosquitoes were kept in contact with normal males, the latter became infected, as tested by the inoculation of an emulsion of their bodies into monkeys. KERR & HAYNE (1932) in a careful series of experiments entirely failed to obtain any transmission of virus from infected females to males kept in contact with them, and HINDLE (1930) showed that Aragão's result could be explained by assuming that the males had been soiled by the faeces of the females which ARAGÃO & da Costa LIMA (1929) had shown to contain yellow fever virus. FROBISHER, DAVIS & SHANNON (1931) showed experimentally that a colony of infected mosquitoes ceased to become infective within 16 weeks, which is approximately the length of time an infected female would have lived. Although *Aëdes aegypti* is unquestionably the most important vector of yellow fever, the Oriental races from India and Java being as efficient carriers as the West African and American races (HINDLE, 1929; DINGER, SCHÜFFNER, SNIJDERS & SWELLENGREBEL, 1929), many other species of mosquitoes have been shown to be capable of transmitting the disease experimentally, or of harbouring the virus for varying periods. Table I comprises a list of the species of insects that have been tested for their capacity in this direction.

Immunity.

The persistence of immunity against this disease has been strikingly demonstrated by SAWYER (1931) who made protection tests with the sera of 60 persons who had had what was believed to be yellow fever between 30 and 78 years previously. The sera of 45 were protective, including 5 out of 6 sera from persons infected 75 years previously and one 78 years, so that ordinarily immunity seems to last for life. HINDLE (1932) trying to find some explanation for the long persistence of such a high degree of immunity, attempted without success to demonstrate residual virus in monkeys that had recovered from yellow fever. Although the inoculation of the tissues of recovered animals into normal monkeys failed to produce infection, those inoculated with liver or spleen developed a transient immunity, but the inoculation of kidney or brain had no effect. The protective value of immune serum is well known, but this passive immunity is of short duration and in the case of monkeys disappears within seven weeks even when a homologous serum is used; when a heterologous immune serum (human) is used, the immunity completely disappears within two weeks (BAUER, 1931b). In striking contrast with the short duration of passive immunity is the strong and lasting protection following the simultaneous injection of virus and immune serum and this method has been recommended by ARAGÃO (1931), and FINDLAY & HINDLE (1931) for the protection of human subjects. The practical difficulties in the application of this method have been largely overcome by the important discovery (THEILER, 1930) that after a few passages in the brains of mice, yellow fever virus loses to a great extent its power of producing a general infection in man or monkey. Consequently by the use of such "mouse virus" it is possible to inoculate human subjects with virus and immune serum without exposing them to the possible risks of fully virulent yellow fever virus, and yet the resulting protection seems to be comparable in strength with that following an attack of the disease. SAWYER, KITCHEN & LLOYD (1932) have elaborated this method of vaccination and recommend the injection of a dried mixture of living yellow fever virus, fixed for mice, and human immune serum, with separate injections of enough additional human serum to make up the amount required for protection. The amount of virus used is generally 0·003 gm. infected mouse brain per kilo body weight, and the total amount of immune serum 0·3 cc. per kilo body weight. The only serious objection to the general use of this method of vaccination is the necessity of obtaining fairly large quantities of human immune serum. Possibly this might be overcome by the use of monkey immune serum or horse anti-yellow fever serum, such as that prepared by PETTIT, STEFANOPOULO & FRASEY (1928), for MARTIN-CHARPENEL, MATHIS & KOLOCHINE (1932) have shown that both these sera neutralize the mouse virus. SELLARDS & LAIGRET (1932) have vaccinated a few patients with small doses of the brains of mice infected with yellow fever after 134 passages in mice. Doses of 1 : 1,000 to 1 : 10,000 of a mouse brain suspension inoculated subcutaneously failed to produce any reaction, but the inoculation was followed by the development of antibodies in the blood. The objection to the general use of this method, apart from any remote possibility of the virus suddenly acquiring virulence, is the fact that live virus would be present in the body of the patient and therefore presumably might be capable of infecting any susceptible mosquitoes that fed on him. The use of immune serum would seem to remove this risk without preventing the development of protective antibodies. For the present other methods of vaccination have been discontinued, for the use of virus exposed to the action of phenol or formaldehyde (HINDLE, 1928) has been found to involve considerable practical difficulties. Although used with success in the South American epidemics (ARAGÃO, 1928), later experiments (OKELL, 1930) showed that the vaccine kept at ordinary ice-box temperatures soon lost its protective properties. HINDLE (1929) showed that the vaccine could be dried without losing its properties and would then remain unchanged for some considerable period, but SAWYER, KITCHEN & LLOYD (1932) found that it was very difficult to estimate the exact degree of exposure of the virus to attenuating agents, necessary to destroy virulence without affecting its antigenic properties.

Complement fixation.

Various attempts have been made to discover some simple test for yellow fever which would obviate the necessity of protective tests in experimental animals. VELLARD & VIANNA (1929) studied modifications of the blood and found there was a marked diminution in its coagulability, due to the appearance of antithrombin in the blood, the change exceeding that in any other disease observed by the authors. Da Costa CRUZ (1929a) found a marked diminution in the amount of complement present in yellow fever patients to less than a quarter of the normal content. The alteration in the amount of complement was found to be due to a reduction of the albumin fraction, the globulin fraction being little affected (da Costa CRUZ, 1930). During convalescence the amount of complement often was in excess of normal. FROBISHER (1929) using a saline extract of infected liver and spleen of yellow fever monkeys as antigen, obtained fairly good results with the complement fixation test. MONTEIRO & TRAVASSOS (1930) also used this method with success. DAVIS (1931) used an antigen consisting of plasma or serum virus, obtained by collecting the blood of infected monkeys on the first or second day of fever. Although very definite results were obtained with infected monkeys this author obtained very inconstant results with human sera. The concentration of complement fixing bodies was found to reach its maximum in monkeys after 30 to 40 days and they remained in the circulation for a few months to more than a year (FROBISHER, 1931a). A second injection restored their strength without producing fever (DAVIS, 1931). HUDSON (1931) found in five human cases of yellow fever that although protective antibodies appeared in the blood five days after the onset of fever, the complement fixation did not appear until after 8 weeks in four cases and remained negative in the fifth case. Various improvements have been suggested in the preparation of the antigen, especially the extraction of fat from the dried liver extract (FROBISHER, 1931a; HUDSON, 1932); but the results obtained by this test which has been used especially in Brazil (MONTEIRO & TRAVASSOS, 1930; SOPER, FROBISHER, KERR & DAVIS, 1932) only give an approximation to the actual number of cases, since complement fixing bodies are less constantly produced and are also less permanent than the protection bodies.

Protection tests.

The presence of active immune bodies in the blood of recovered yellow fever patients, furnishes an obvious method of testing the incidence of the disease in any particular locality. The earlier tests involved the use of monkeys and consequently could only be applied on a comparatively small scale. THEILER (1931) showed that by using yellow fever virus adapted to mice, tests could be made in these animals. SAWYER & LLOYD (1931) modified the original method of injecting the serum and virus intracerebrally, for it was found that if yellow fever virus fixed for mice, was inoculated intraperitoneally, and at the same time an intracerebral injection of 0·03 cc. of 2 per cent. corn starch in 0·9 per cent. sodium chloride, the virus became localized in the brain. The serum to be tested is mixed with the virus before being inoculated into the mice and if protective bodies are present no infection results. This intraperitoneal test in mice is highly sensitive, many sera which do not protect monkeys protecting mice; consequently it is of great value in epidemiological studies of the disease and also to test whether vaccinated persons have been fully immunized.

Non-specific immunity against yellow fever.

The absence of yellow fever from Oriental countries has sometimes been attributed to a supposed protection conferred by a previous attack of dengue fever. This hypothesis has recently received some support from an observation of DINGER (1931b) who inoculated 11 monkeys that had suffered from dengue 13 to 36 days previously, with virulent yellow fever material. Three of these monkeys died of typical yellow fever but the remaining eight were unaffected, although control monkeys showed a mortality exceeding 90 per cent. On the other hand, STEFANOPOULO & CALLINICOS (1932) made yellow fever protection tests in mice with the sera of 11 patients who had recovered from severe attacks of dengue in Greece, but none of the sera gave any protection; therefore the resistance of the recovered dengue monkeys to yellow fever would seem to require some other explanation.

Occasionally in mouse protection tests examples of non-specific immunity have been recorded, the sera of persons who could never have been exposed to yellow fever, in some unexplained manner protecting experimental animals against infection. Thus HUGHES & SAWYER (1932) examined the sera of 109 Canadian residents by means of the intraperitoneal test in mice; one serum gave complete protection and five inconclusive results, the remainder being negative. Also two sera out of 53 collected at Madras gave definite protection (JOHNSON, 1932). The rarity of such cases, however, shows that they are so exceptional as in no way to invalidate the general results of epidemiological studies based on these protection tests.

Yellow fever in experimental animals.

Since the original demonstration of the susceptibility of *Macacus rhesus* to this disease a very large number of animals have been tested for their capacity of harbouring yellow fever virus. Many species of primates have been shown to be susceptible and in the majority of macaques and most South American monkeys the disease is very fatal, producing a type of infection resembling severe human cases. In other species on the other hand such as *Cercopithecus tantalus* the disease is only rarely fatal, but the virus can be recovered for some time after inoculation from the blood of the animal. Other species, such as the baboon, seem to be definitely resistant, but if inoculated with virus, their serum may develop anti-viral properties.

Table 2 summarizes the results of recent attempts to infect various species of animals with yellow fever.

TABLE 2 *

Summarizing the results of recent attempts to infect various species of animals with yellow fever.

Species of animal	Result of inoculation with virus	Authority
ORDER PRIMATES		
Family Pongidae		
Chimpanzee (probably *Pan satyrus*)	Resistant, but blood develops anti-viral properties .	Stokes, Bauer & Hudson, 1928. Pettit & Aguessy, 1932
Family Cercopithecidae		
Cercopithecus mona	Resistant	Bauer & Mahaffy, 1930b
C. tantalus	Persistence of virus in blood with no obvious ill effects ..	,, ,,
C. griseo-viridis ... (= *C. aethiops*)	Resistant .. .	Pettit & Stefanopoulo, 1929
C. callitrichus ... (= *C. sabaeus*)	,, ...	,, ,,
Erythrocebus patas ...	Persistence of virus in blood with no obvious ill effects ...	Bauer & Mahaffy, 1930b
Cercocebus torquatus	,, ,, ,,	,, ,,
Macacus rhesus ... (= *Macaca mulatta*)	Susceptible	Stokes, Bauer & Hudson, 1928.
M. sinicus ... ... (= *Macaca radiata*)	,, ...	,, ,,
M. cynomolgus ... (= *Macaca irus*)	,, ...	Aragão, 1928a.

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* The names in brackets are those given by FLOWER in his list of mammals. [*List of the Vertebrate Animals exhibited in the Gardens of the Zoological Society of London*, 1828–1927. Vol. 1. Mammals. By Major S. S. FLOWER.]

TABLE 2—*continued.*

Species of animal	Result of inoculation with virus	Authority
M. speciosus ... (= *Macaca fuscata*)	Susceptible	Aragão, 1928b.
M. inuus ... ... (= *Macaca sylvana*)	,, ...	Pettit & Stefanopoulo, 1930.
M. nemestrinus ... (= *Macaca nemestrina*)	Slightly susceptible ...	Dinger, Schüffner, Snijders & Swellengrebel, 1930a.
Papio sphinx ... (= *Papio papio*)	Resistant, but blood develops antiviral properties	Pettit & Stefanopoulo, 1929.
Cynocephalus hamadryas ... ... (= *Papio hamadryas*)	,, ,, ,,	,, ,,
Family Cebidae.		
Aotus trivirgatus ... (= *Aotes trivirgatus*)	Slightly susceptible ...	Davis, 1931.
Callicebus moloch ...	,, ,, ...	,, ,,
Pithecia monacha . . (= *P. monachus*)	,, ,,	,, ,,
Cacajao rubicundis (= *C. rubicundus*)	Resistant	,, ,,
Saimiri sciurea ...	Susceptible	Kuczynski, 1929.
Cebus macrocephalus (= *C. fatuellus*)	Slightly susceptible ...	,, ,,
C. variegatus ... (= *C. xanthosternos*)	,, ,,	Davis, 1930a.
Lagothrix lagotricha (= *L. humboldtii*)	,, ,,	,, 1930b.
Ateles ater	Susceptible	,, ,,
Alouatta seniculus ...	,, ...	,, 1931.
Family Hapalidae.		
Callithrix jacchus ... (= *Hapale jacchus*)	Susceptible	Kuczynski, 1929.
C. albicollis ... ... (=*Hapale albicollis*)	,, but disease unlike human	Davis, 1930
Leontocebus ursulus (= *Mystax ursulus*)	,, ,, ,,	,, ,,
ORDER CHIROPTERA.		
Molossus obscurus ...	Resistant	Kumm, 1932.
Desmodus rotundus	,, ...	,, ,,
ORDER CARNIVORA.		
Domestic Cat ...	Survival of virus in blood for at least 30 days	Monteiro, 1930.
Dog	Survival of virus in blood for a few days	,, ,,
ORDER RODENTIA.		
Guineapig ... ... (*Cavia porcellus*)	Modified infection ...	Kuczynski & Hohenadel, 1930. Dinger, Schüffner & Snijders, 1930.

Yellow fever virus in mice.

In addition to the ordinary "septicaemic" type of yellow fever, THEILER (1930) has produced a "neurotropic" strain by the intracerebral inoculation of the virus into mice. These animals are resistant to the intraperitoneal injection of ordinary virus, such as that occurring in the blood of cases of yellow fever in man or monkeys, but if this virus is introduced intracerebrally some of the mice become ill and die with symptoms of encephalitis. If this virus is propagated in mice by brain to brain inoculations, after a few generations it acquires definite neurotropic characters and if inoculated subcutaneously into a monkey or man no longer produces any obvious signs of infection. Nevertheless, in spite of the absence of any symptoms of yellow fever, the blood of these subjects develops antibodies against this disease, equal in intensity to those developed after recovery from an attack of typical yellow fever. These results have been confirmed by DINGER (1931), SELLARDS (1931) and others, and now form the basis of immunization against yellow fever by the use of living virus and immune serum (see above p. 282).

The neurotropic virus is capable of reverting to the ordinary septicaemic type after only a few passages in mice, and DINGER (1931a) found that mosquitoes fed on a serum suspension of the brains of infected mice, at the 10th to the 12th passage, became infective and produced typical yellow fever when fed on monkeys. DAVIS, LLOYD & FROBISHER (1932) found that when the virus had been passaged in mice for longer periods the neurotropic character became fixed and even when the virus was ingested by mosquitoes remained unaltered. By the bites of these mosquitoes encephalitis was produced both in white mice and rhesus monkeys.

SELLARDS (1931) showed that when monkeys were inoculated intracerebrally with the neurotropic mouse virus, they regularly developed a fatal encephalitis but without any characteristic changes in the liver, and four passages in monkeys by direct inoculation from brain to brain failed to restore the original properties of the virus. Two monkeys, however, inoculated intracerebrally with blood virus died of typical yellow fever with necrosis of the liver but no signs of encephalitis. Similar results have been obtained by LLOYD & PENNA (1932) and demonstrate the fixed nature of the neurotropic virus, which differs fundamentally from the parent strain.

Pathology.

Intranuclear inclusions.—The most notable recent advance in this subject has been made by TORRES (1928 *et seq.*) who in a series of papers called attention to the importance of the so-called oxychromatic degeneration of the liver cells in yellow fever, resulting in the development of characteristic acidophile inclusion bodies within the nuclei, of the same general type as those produced in certain other virus infections, such as herpes zoster, varicella, virus III of rabbits, etc. These inclusion bodies have also been studied in detail by COWDRY & KITCHEN (1930). With the exception of a few very rare cases, in which some of the suprarenal cells showed the bodies, they are restricted to the liver cells. Although almost constantly present in monkeys dying of yellow fever, they have not been found with the same regularity in human cases of the disease. TORRES (1929) examined 12 fatal cases of the disease in Brazil with negative results, and HOFFMANN (1929) found them in only one—a West African—out of a large number of cases. KLOTZ & BELT (1930) found inclusion bodies in 38 per cent. of human African cases and in only 9·2 per cent. of American, but the tissues of the latter group were not so well fixed. Later observations, summarized by TORRES (1931), support the view that the presence of these bodies may be correlated with the existence of virus, for they have been found in rapidly fatal human cases of the disease whose tissues presumably would still be infective. Moreover they disappear very rapidly in recovered monkeys. SNIJDERS & DINGER (1931), however, consider that the intranuclear bodies represent specific degenerative changes produced in the course of the disease. In monkeys and mice infected with the neurotropic strain of yellow fever THEILER (1930) & GOODPASTURE (1932) have found intranuclear inclusions in the ganglion cells of some of the infected animals.

The *general pathological changes* in the spleen, liver and kidneys of yellow fever cases have been studied in detail by KLOTZ & BELT (1930) who found that there was no significant difference between African and American cases. In every case of recovery complete and scarless regeneration occurred. MAGALHAES (1931) has described the changes in the kidney and LLOYD (1931) the changes in the myocardium of yellow fever in monkeys and man. PENNA & DE FIGUEIREDO (1930) consider that the presence of the so-called Councilman necrosis of the liver cells is the most certain method of diagnosing human cases of yellow fever.

KUCZYNSKI with HOHENADEL (1929) in a series of publications advanced the view that an organism named *Bacillus hepatodystrophicans* is the causative organism of yellow fever. MANTEUFEL & HERZBERG (1930) found that this bacillus was identical with *Bacterium renale cuniculi*, an organism often present in the kidneys of apparently normal rabbits, and also found that media containing fresh kidney tissue might show no signs of infection until after 20 days incubation period. Da Costa CRUZ (1929b) considered the bacillus akin to *Corynebacterium lymphophilium*, and DINGER, SCHÜFFNER & SNIJDERS (1931) also considered that it was a diphtheroid.

Miscellaneous observations.

Cultivation of virus.—HAAGEN & THEILER (1932) have cultivated the virus of yellow fever, pathogenic for mice, in a medium consisting of minced chicken embryos suspended in a mixture of normal monkey serum and Tyrode solution, and incubated at 37°C. The virus seems to be capable of being grown indefinitely by making subcultures every three or four days and has been tested up to the 22nd subculture without showing any diminution in virulence.

Chemistry and Metabolism.—The chemistry and metabolism of experimental yellow fever has been studied in a series of papers by WAKEMAN & MORRELL (1931, 1932), their results supporting the view that all the metabolic changes can be interpreted as resulting from a loss of liver function, there being no definite evidence of serious impairment of kidney function. They also confirmed KUCZYNSKI & HOHENADEL'S (1929) observations as to the extreme hypoglycaemia occurring towards the end of infection.

FINDLAY & HINDLE (1930) showed that one of the toxins developed in yellow fever is a guanidine-like substance, the quantity of which increases in the blood of infected monkeys up to more than double the amount present in normal monkeys. Injections of calcium lactate were found to reduce the guanidine base content of the blood, and also if given at four-hourly intervals prevented haemorrhages. Even when combined with injections of dextrose, however, this treatment failed to prevent the final collapse and death of monkeys infected with yellow fever, but it may be of use in preventing haemorrhages.

Properties of virus.—SELLARDS & HINDLE (1928) showed that the virus could be preserved in the frozen state and HINDLE (see FOWLER, 1928) also proved that it retained its properties indefinitely if dried *in vacuo*. SAWYER, LLOYD & KITCHEN (1929) found that it was best to freeze the infected material before drying *in vacuo*. Virus kept in 50 per cent. glycerine remained potent for at least 60 days when stored in the refrigerator, but after 100 days gradually lost its virulence. PETTIT, STEFANOPOULO & KOLOCHINE (1929) recommend the use of Vallé's glycerine phosphate mixture for preserving infected liver or blood in the refrigerator. FROBISHER (1930) noted some of the properties of the virus, which differs from bacteria in its power to withstand the action of such disinfectants as mercuric chloride 1 in 7,500, phenol 1 in 150, etc., for 30 minutes at 30°C. Serum virus was completely inactivated when heated at 60°C. for 10 minutes. Dried blood virus was still infective after a similar exposure. The size of yellow fever virus particles has not yet been accurately determined, but it is well known that the virus will pass through ordinary porcelain filters. SAWYER & FROBISHER (1929) showed that although the virus in the mosquito, if suspended in salt solution, is arrested by Berkefeld filters V and N, yet the addition of an equal volume of normal monkey serum, makes it filterable. Consequently the virus in the mosquito does not differ from the virus in the blood with regard to filtration. BAUER & MAHAFFY (1930a) showed that the virus would pass through filters as fine as Chamberland L 11 candles without showing any marked diminution in concentration, which in the blood of infected monkeys may contain as much as 1,000,000,000 lethal doses per cc. (BAUER, 1931a). Saline was found to have a very deleterious effect on the virus which died out within 6 hours or less in such suspensions, but if 10 per cent. serum was added this effect was very much reduced.

HINDLE & FINDLAY (1930) using Bedson & Bland's method found that the virus of yellow fever is negatively charged at pH ranging from 5·2 to 7·0 and is destroyed in acid media of pH 3·0 to 4·0. FROBISHER (1931b) using a U-tube apparatus obtained similar results and found that between pH 7·4 and 6·2, the virus passes through its isoelectric range and then tends to reverse the direction of its migration, thus behaving like an amphoteric colloid. In slightly alkaline dilutions antibodies were found to carry a negative charge.

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MEDICAL ENTOMOLOGY.

Buxton (Patrick A.). **The Effect of Climatic Conditions upon Populations of Insects.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. pp. 325–356. With 5 figs. [63 refs.]

This paper is a review on the relation of insects to climate, and must be read in full if the whole argument is to be appreciated. The numbers of insects are altered by many different causes, the most important being climate and an increase or decrease of their enemies and parasites. Seasonal changes in the insect population may be correlated with the incidence of certain diseases, such as the relation between rat fleas (*Xenopsylla cheopis*) and plague in rats and men in tropical countries, and between lice and relapsing fever in Northern India. Similarly, excess of winter rain in Mediterranean countries is followed by a great increase in the numbers of Anopheles and by outbreaks of malaria. The factors at work in these cases may be investigated either in the field or in the laboratory. Field observations are a necessary preliminary, but their function is largely to set problems which can subsequently be solved only in the laboratory, where experiments can be devised in which single factors vary; the most important factors being temperature and humidity.

It is generally found that insects die after one hour at 104°F. to 113°F., or after an exposure of 24 hours between 95°F. and 104°F. In many parts of the Tropics the shade temperature exceeds these limits, and this is probably why insects become rare at particular seasons. On the other hand, while in warm climates many insects exist at temperatures approximating to the fatal, they can survive temperatures many degrees below what they encounter in nature. Temperature factors often operate at critical points in the life cycle, but so far as insects of medical importance are concerned, in no species have these critical points been determined. Furthermore, apart from its *lethal* effect, temperature very largely determines the *velocity* of insect development.

So far as the factor of humidity is concerned, insects may be divided into two classes—water "spenders" and water "savers." The former live in moist environments, eat food of high water-content, and lose water readily in their excretion, etc. The latter class live in dry environments on dry food, and are resistant to starvation. The tsetse fly (Glossina) is obviously a "spender," depending on high atmospheric humidity; the adults of Lucilia, Calliphora and Musca, and the larva of *X. cheopis*, also come into this category. On the other hand, the tick, *Ornithodorus moubata*, the adult *X. cheopis*, and the bugs Cimex and Rhodnius, are "savers." In hot dry air a large insect may or may not regulate its body temperature by evaporation, but it can be proved by calculation that a small insect cannot do this, and it depends for its existence on having a high thermal death point and on being a water "saver" In many insects, both in the egg and adult stages, the rate of loss of water and consequently the duration of life of the fasting insect is determined (within certain limits) by saturation deficiency. This generalization may prove of value in forecasting changes in insect populations; but it is most important to study this and other climatic factors affecting insects in the actual situations in which the insect lives (the " micro-climate ") which may be very different from the climate recorded by the meteorologist. It is possible that to change the micro-climate may prove the simplest method of eliminating certain insect pests. *V. B. Wigglesworth.*

BUXTON (Patrick A.). **Terrestrial Insects and the Humidity of the Environment.**—Reprinted from *Biol. Reviews.* 1932. Oct. Vol. 7. No. 4. pp. 275–320. With 4 figs. [6 pages of refs.]

This is a comprehensive review of the present state of knowledge on the relations of terrestrial insects to water. The aim of the work is to interpret ecological observations on insects in terms of physiology, and it deals with the following topics : (i) gain of water : by drinking and feeding, from metabolism, and by absorption from the atmosphere ; (ii) loss of water : by excretion and by evaporation ; (iii) water balance : dealing with the water content and its regulation ; and (iv) the influence of humidity on the egg stage, in causing dormancy and such like. Insects of medical importance figure frequently in the course of the argument. There is a bibliography including more than 250 titles. *V. B. Wigglesworth.*

DUNN (Lawrence H.). **An Effective Method for Collecting Ectoparasites from Live Animals and Birds.**—Reprinted from *Psyche.* 1932. Vol. 39. Nos. 1–2. pp. 26–29.

Animals such as opossums, monkeys, squirrels or peccaries, and also birds, are readily freed from lice and fleas by the following procedure. The legs are tied together and the animal placed in a large glass jar with the head exposed ; the jar is closed above by a towel wrapped round the animal's neck ; and chloroform is then applied to the towel Most of the ectoparasites fall to the bottom of the jar ; the remainder are combed out of the animal's fur.

V. B. Wigglesworth

HOFFMAN (W. A.). **Recent Progress in Medical Entomology.**—*Bol. Asoc. Med. de Puerto Rico.* 1932. Nov. Vol. 24. No. 206. pp. 650–662. [57 refs.]

A very readable report of a lecture dealing with advances during the last five years. The chief subjects treated are yellow fever and the typhus group of diseases (Brill's disease, Mexican typhus, Marseilles fever and Rocky Mountain spotted fever). Shorter sections recall recent work on Oroya fever, the transmission of filarial worms by blood-sucking insects and the use of blow-fly larvae in the treatment of chronic osteomyelitis. *V. B. Wigglesworth.*

SCHWETZ (J.). Notes géographiques d'entomologie médicale sur la province Orientale (Congo Belge). (Tiques, Tabanides et " Maringoins." [**Geographical Notes on Medical Entomology in the Eastern Province of Belgian Congo (Ticks, Tabanids and " Midges ").**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 549–555.

The lists and notes of which this paper consists are offered as a contribution to a more or less complete study of the distribution of the various blood-sucking insects and ticks found in the spacious

Eastern Province of Belgian Congo. Such a study, however, is a matter for the distant future, and must be based on the painstaking work of a number of observers. The collections now recorded were made at Stanleyville and elsewhere in the Eastern Province, from 1927 to 1929. Mosquitoes, tsetse flies and the genus *Phlebotomus,* which have been dealt with by the author in previous papers, are not included. " Maringoins " (freely rendered above as " midges ") is the term bestowed in Belgian Congo upon small blood-sucking Diptera of various genera—Culicoides and Simulium, as well as Phlebotomus. As regards Simulium, Schwetz thinks that *S. neavei* may be concerned, as is *S. damnosum,* in the transmission of onchocerciasis. *E. E. Austen.*

BEATTIE (Mary V. F.). **The Physico-Chemical Factors of Water in Relation to Mosquito Breeding in Trinidad.**—*Bull. Entom. Res.* 1932. Dec. Vol. 23. Pt. 4. pp. 477–496. With 11 figs. & 2 plates. [15 refs.]

In continuation of the physico-chemical studies, carried out by her some years ago, of the factors which possibly control the selection by mosquitoes of breeding-places near London, the author worked in Trinidad, B.W.I., from June 1929 until April 1931. In this island *Anopheles tarsimaculatus,* a species remarkable for its catholicity of choice in the matter of breeding-places, was found to be the prevalent Anopheline, and it was accordingly decided to limit the investigation, the results of which proved mainly negative, to an analysis of the waters upon which its eggs are deposited. In Trinidad, the larvae of *A. tarsimaculatus* are met with " indiscriminately in fresh or saline waters, having been found in ground pools, small pools in meadows, the edges of marshes, railway borrow-pits, dirty irrigation canals and rice-fields." With regard to the *hydrogen ion concentration* and CO_2 contents in the case of six " potential breeding-places " (ponds) selected by the author for analysis, the conclusion, supported by tables and figures, is that " no definite correlation exists between the reaction of the water and the prevalence of *A. tarsimaculatus.*" Neither did the total *organic nitrogen* nor the *dissolved oxygen,* " alone or in combination," appear to have any influence on the prevalence of *A. tarsimaculatus* in any of the ponds ; *nitrites and nitrates* also showed no correlation with Anopheline prevalence ; *phosphates* (not present in any great quantity in any of the ponds examined) " had no apparent effect on Anopheline breeding." The *chloride* content in all but one of the ponds was extremely low, but " increase in salinity did not influence the prevalence of *A. tarsimaculatus* " ; and " no correlation was found between the amount of total solids present in the ponds, and the prevalence of Anophelines."

The prevalence of *A. tarsimaculatus* larvae in the ponds appeared, however, to vary inversely with the amount of *ammonia nitrogen* in the water ; but since, in the laboratory, larvae were found to thrive in water " with an ammonia nitrogen content of 0·1 to 0·2 parts per 100,000," the author suggests that it may be oviposition that is affected by this factor. Subsequent investigation of rice-field and canal waters confirmed this hypothesis, while in the laboratory *A. tarsimaculatus* larvae lived for several days in rice-field waters containing as much as 0·12 parts of ammonia nitrogen per 100,000. Thus, from data collected during the first year of the investigation, *ammonia nitrogen* seemed to be the only factor in any way correlated with larval incidence. The author, who in the first year had investigated breeding-places of a general character, therefore decided, owing to the evolution of nitrogen gas in the soil of rice-fields, and the importance of the latter as Anopheles breeding-grounds in the tropics, in the second year to analyse the waters of rice-fields and irrigation-canals. During the first year *A. tarsimaculatus* larvae had appeared to be more abundant in the canals than in the rice-fields, where they became very rare when the crop was more than a foot in height. Six rice-field stations were selected for study, and analysis of field- and canal-waters was begun in June 1930. Here also the physico-chemical conditions appeared to have no effect upon mosquito-breeding. " No correlation was found between the incidence of *A. tarsimaculatus* and the following factors : pH, carbon dioxide, organic nitrogen, dissolved oxygen, nitrites, nitrates and phosphates."

A summary is given of the results obtained by recent workers who, in various parts of the world, have studied the complex problem of the selection of breeding-places by mosquitoes. We are not much wiser than before, and since inhibiting factors conceivably vary with the species of mosquito, the problem needs to be solved for each species, a task of no small magnitude.

In continuation of research upon the breeding-place preferences of *Aëdes argenteus* (= *A. aegypti*) and *A. variegatus* initiated by BUXTON & HOPKINS in Samoa (1927), the author carried out two experiments with the former species, in the laboratory and in the field respectively. From the results it is inferred that water containing organic nitrogen in solution is preferred by the ovipositing yellow fever mosquito, and that the higher the organic nitrogen content the more attractive is the water. *E. E. A.*

HOSKINS (W. M.). **Toxicity and Permeability. I. The Toxicity of Acid and Basic Solutions of Sodium Arsenite to Mosquito Pupae.**—*Jl. Econom. Entom.* 1932. Dec. Vol. 25. No. 6. pp. 1212–1224. With 3 figs. [32 refs.]

The contents of this highly technical paper cannot adequately be conveyed in the form of a summary, and the malariologist who is interested should consult the original. While anti-mosquito measures are of course directed mainly against larvae, Hoskins, whose work was done in California, employed pupae (of *Culex tarsalis*) as the subjects of his experiments, in order to eliminate the complication that would otherwise have been introduced by the pH of the contents of the larval intestine. The relative toxicity to the pupae of dilute acidified and of basic solutions of sodium arsenite was determined by means of the lengths of immersion needed to produce a mortality of 50 per cent. It was found that, over the range of concentration from 0·01 to 0·03 molar solutions, the toxic action of the acidified solutions is approximately 4½ times as rapid as that of the basic solutions. This is considered to be due to the ease with which tissues are penetrated by the arsenious acid molecules of the acid solutions, as compared with the difficulty experienced by the arsenite ions of the basic solutions in effecting similar penetration. It is to be noted that, while " the taking in of arsenic [by the mosquito pupa] is relatively rapid . . . . the toxic effect is exerted slowly." Thus, although 50 per cent. of the pupae died after exposure to arsenite solutions lasting from 26·5 to 800 minutes according to concentration and pH, death itself did not occur until 2 or 3 days later. Analyses in order to determine the minimum lethal dose of arsenic, made in pupae which died after exposures of definite length, proved unsuccessful owing to the minuteness of the amounts involved. *E. E. A.*

BADENOCH (A. G.). **Twelve Months Records of Mosquito-Breeding in Telok Anson with Special Reference to Hydrogen-Ion Concentration.**—*Malayan Med. Jl.* 1932. Sept. Vol. 7. No. 3. pp. 82–87, & 90. With 1 graph. [11 refs.]

The hydrogen-ion concentration of the natural waters in this region (as determined by a rough colorimetric method) ranged from pH 4·0–8·5. The common species of Anopheles as well as the Culicine mosquitoes were found breeding throughout this range. But "though the actual range has been shown to be wide, the investigations left in [the author's] mind little doubt but that neutral and slightly alkaline waters are *favoured* by local Anophelines, in preference to acid waters." No actual figures are given to support this contention.

V. B. Wigglesworth.

i. WIGGLESWORTH (V. B.). **The Adaptation of Mosquito Larvae to Salt Water.**—Reprinted from *Jl. Experim. Biol.* 1933. Jan. Vol. 10. No. 1. pp. 27–37. With 2 figs. [25 refs.]

ii. VILLAIN (Georges). Note sur la présence de larves d'anophélines dans les eaux salées du Sahel Tunisien. **(Notes on the Presence of Anopheline Larvae in the Salt-Waters of Tunisien Sahel.)**—*Riv. di Malariologia.* 1932. May–June. Vol. 11. No. 3. pp. 346–352. [12 refs.] English summary (4 lines) p. 414.

i. The object of this contribution, which should be read in conjunction with two previous papers ("The Effect of Salts on the Anal Gills of the Mosquito Larva," and "The Function of the Anal Gills of the Mosquito Larva") by its author in the same number, was to determine the nature of the physiological adaptation which enables the larvae of certain mosquitoes to flourish both in fresh and salt water, while the latter is rapidly fatal to the larvae of other species of mosquito.

As the subjects of his experiments, Wigglesworth employed larvae of the yellow-fever mosquito, *Aëdes argenteus* (= *A. aegypti*); although the larva of this species is unable to tolerate water possessing a high degree of salinity, "it is probable that the relatively small *degree* of resistance which it can acquire is of the same *kind* as that occurring in more tolerant species, and therefore the mechanism of this resistance may throw light upon the general problem." In place of ordinary sea water, the author used an artificial sea water of which the composition is given, and the osmotic pressure of which was about the same as that of 3·5 per cent. sodium chloride. The concentration of this "sea water" is expressed in terms of solutions of NaCl having the same osmotic pressure.

While there were considerable individual variations, fourth stage (final instar) larvae, reared in fresh water and transferred to sodium chloride solutions of various strengths at 74°C., were unaffected by solutions not exceeding 0·9 per cent., but in a 1·1 per cent. solution nearly all died in 4–7 days. "Sea water" proved to be less lethal than pure sodium chloride, " 1·5 per cent." sea water having about the same degree of toxicity as 1·2 per cent. sodium chloride. In studving the effect of salts upon the growth of newly-hatched larvae, the latter were fed upon powdered Loeffler's serum, in order to eliminate the indirect influence on growth which salt water might otherwise have through its action upon the micro-organisms which form the natural food of the larvae. In concentrations of sodium chloride the growth of newly-hatched larvae is but very slightly retarded below 0·8 per cent., after which the inhibitory effect rapidly increases. Such larvae are killed by 1·1 per cent. NaCl., or by " sea water " equivalent to 1·3 per cent. NaCl. When the concentration was gradually increased larvae could be made resistant to 1·1 per cent. NaCl and to " sea water " equal to 1·75 per cent. NaCl (50 per cent. sea water). No obvious difference in appearance is to be noted between larvae habituated to 1 per cent. NaCl and those in fresh water; in " sea water " equivalent to 1·75 per cent. NaCl, on the other hand, larvae have a " shrunken appearance," which increases with the concentration. Further differences occur in the anal gills, which Wigglesworth, in the second of the two papers mentioned above, considers to be " primarily water-absorbing organs . . . . only incidentally concerned in respiration "). It is pointed out by the author in the " Discussion " forming the latter part of the paper under consideration that the larvae of certain species of mosquito can resist " far higher concentrations of salt " than those lethal to the subjects of his experiments. Thus R. Vogel, in 1927, recorded the finding of larvae of *Aëdes zammittii* " in pools of concentrated sea water with crusts of salt on the surface " ; and during the War, near the eastern side of the Suez Canal, the present writer found both Anophelines (*A. multicolor*) and a Culicine breeding freely in water containing 8,716 parts of NaCl per 100,000.

When a larva accustomed to 1 per cent. NaCl was placed by Wigglesworth in tap water after its body had been ligatured just in front of the Malpighian tubes, excretion of fluid by the Malpighian tubes showed a great increase; small drops " were passed down the hind gut, on an average, every 2 min. for half an hour, and yet only three very small drops were discharged from the anus." There was no accumulation of fluid in the rectum, so that it was evident that it had been reabsorbed into the body, which became greatly swollen behind the ligature. The author suggests that " increased activity on the part of the rectum in reabsorbing fluid may be a factor both in the adaptation of the larva to salt water and in the excessive swelling which occurs when such larvae are ligatured and restored to fresh water." Larvae, however, display considerable individual variation in their response to this treatment. *Aëdes argenteus* larvae which had been deprived of their gills were not more resistant to salt water than larvae in which the anal gills were entire : this "serves to confirm the conclusion that these larvae are not killed by the osmotic pressure but by the toxic action of the salt water, acting probably by way of the intestine."

ii. In October, 1931, larvae of *Anopheles maculipennis* and *A. multicolor* were discovered—the latter for the first time in the Sahel—in saline water, destitute of plant life, in an irrigation drain at Bekalta. In the laboratory it was noticed that the larvae of *A. multicolor* were in the habit of remaining at the bottom of the receptacle in which they were kept, buried in fine silt. The water in the drain, the pH of which was 8·4, contained 35·4 gm. of chlorides per litre; on November 8, owing to concentration due to evaporation, the chloride content of the sample of this water in which one of the *A. multicolor* larvae was still living was 41·6 gm. per litre. [Seawater contains approximately 30 gm. per litre.] This communication shows that in Tunis *A. multicolor* is not purely Saharian; the presence of *A. maculipennis* larvae where they were found is thought to be due to their having been washed out of their natural breeding places by rain. *E. E. A.*

KALANDADSE (L.). Materialien zum Studium der Atmungsprozesse der Mückenlarven und -puppen und der Einwirkung von Petroleum, Beschattung und Verunreinigung des Wassers auf dieselben. **[Studies on the Respiration of Mosquito Larvae and Pupae and the Effect upon them of Petroleum, Shade and Dirty Water.]**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Feb. Vol. 37. No. 2. pp. 88–103. With 1 fig. [14 refs.]

Larvae of Culex, Stegomyia and Anopheles can survive submergence for several hours, the time of survival being greatest in Stegomyia. This is attributed [without evidence] to respiration through the anal gills. The mode of action of petroleum on larvae is discussed and the author's experiments favour the [now generally accepted] view that it serves as a contact poison acting through the tracheae. Larvae of *Anopheles maculipennis* developed more slowly in the dark; but the amount of shade provided by overhanging vegetation had no significant effect on the rate of growth. Contamination of the water with horse manure made it unfavourable for *A. maculipennis*, but did not prevent breeding entirely. *V. B. Wigglesworth.*

MARSHALL (J. F.) & STALEY (J.). **On the Distribution of Air in the Oesophageal Diverticula and Intestine of Mosquitoes. Its Relation to Emergence, Feeding and Hypopygial Rotation.**—*Parasitology.* 1932. Oct. Vol. 24. No. 3. pp. 368–381. With 8 figs. [14 refs.]

Much uncertainty, reflected in a varying nomenclature, has hitherto prevailed with reference to the function of the oesophageal diverticula in mosquitoes. Working at the British Mosquito Control Institute, Hayling I., April–November, 1931, the authors, who dissected upwards of 800 mosquitoes both before and after emergence from the pupa, have shed a more precise light on the question.

The hatching of the adult mosquito is facilitated by the swallowing by the latter of air which accumulates under the pupal skin. This air passes directly to the stomach, causing expansion and thus helping to rupture the pupal envelope. Subsequently, within an hour after emergence of the imago has taken place, the air in the mid-gut begins to pass forward into the oesophageal diverticula, previously empty, and in 12–22 hours the mid-gut has ceased to contain air. The later behaviour of the oesophageal diverticula depends upon the nature of the food. When mosquitoes are fed on fluid other than blood (*e.g.* raisin juice), " the liquid goes direct into the oesophageal diverticula and [as found 30 years ago by NUTTALL & SHIPLEY] displaces the air more or less completely." When the insects suck blood, the latter passes " entirely (or almost entirely) " straight into the stomach. Air in the diverticula of " domestic " mosquitoes diminishes in amount before hibernation, but increases in quantity as the hibernating period approaches its end. No confirmation was obtained for SCHAUDINN'S view that lodgment of air in the diverticula is but temporary, and that the air is replaced by carbon dioxide resulting from the action of yeast cells contained in the sacs. In newly-emerged male mosquitoes, it was found that the rotation of the hypopygium through 180° and the expulsion of the air from the mid-gut into the oesophageal diverticula take place concurrently.

An interesting " Note on Mosquito Bites," from which it appears *inter alia* that those of two *Aëdes detritus*, subsequently " found to have a large number of yeast cells in their sacs," were not unusually irritating, is included in the paper. *E. E. A.*

HAMLYN-HARRIS (R.). **Some Further Observations on** *Chara fragilis* **in Relation to Mosquito Breeding in Queensland.**—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 519–524.

Although most investigators who have studied the subject consider that charophytes are of no value for the prevention of mosquito breeding, MATHESON & HINMAN, working with certain species of Characeae, obtained positive results and are therefore of the contrary opinion. Hamlyn-Harris is on the side of the majority, and contends that his experiments, some of which are described in this paper, " conclusively prove . . . . that *charophytes are of no value* in the biological control of mosquitoes in Queensland." While it frequently happens that mosquito larvae are absent from waters containing Chara, this may be due to a variety of causes with regard to which we are at present entirely ignorant. Using the two house mosquitoes of Queensland, *Stegomyia fasciata* (= *Aëdes aegypti*) and *Culex fatigans*, as well as the tree-hole breeder *Aëdes notoscriptus*, and affording them free access to " dozens of jars . . . . containing various types of aquatic vegetation . . . . at the same temperature and under similar conditions throughout," the insects, *mirabile dictu*, oviposited only in the jars in which there was *Chara fragilis*. The experiments lasted for months, during which the pH showed little variation ; the respective control jars contained Hydrilla, Ceratophyllum, Valisneria and other aquatic plants ; and the Chara (from horse troughs in which *Anopheles annulipes* had been found breeding) was either in various stages of vigorous growth, or decomposing. In the latter condition in one instance lasting for 8 months, the plant " imparted to the water a most unpleasant foetid smell, suggestive of garlic," yet *Aëdes aegypti* bred " specially freely " in this water. Among mosquito enemies in the jars were a fungoid growth (*Saprolegnia monica*), which proved fatal to young larvae of *Culex fatigans* whenever it attacked them ; certain unspecified Coleopterous larvae ; and a peculiarly voracious species of Hydra. *E. E. A.*

REICHSGESUNDHEITSAMT, Berlin. Die Mückenplage und ihre Bekämpfung. [**The Mosquito Nuisance and how to deal with it.**] 4th Edition.—40 pp. With 12 figs. & 1 coloured plate. 1932. Berlin : Verlag von Julius Springer.

In the 21 years that have elapsed since the appearance of the previous edition of this pamphlet, much new experience in mosquito-control has been gained, justifying the present edition, which has been prepared by Dr. VON SCHUCKMANN. Germany is infested by 38 species of mosquitoes, or 10 more than those represented in the

British Is.; it is consequently not a matter for surprise if summer days at bathing resorts on the Baltic suffer the same drawbacks as did Hayling I. prior to the era of what is now the British Mosquito Control Institute.

The present pamphlet, a sound and conscientious piece of work, follows familiar lines, except that official reticence concerning proprietary articles, which is the rule in this country, apparently is not practised in Germany. Thus, under larvicides, three proprietary fluids are mentioned by name; and similarly, for the destruction of adult mosquitoes hibernating in houses, several insect-powders and sprays, not known in the British Is., are recommended. In dealing with the systematic carrying-out of anti-mosquito measures, the importance of organized as compared with individual and spasmodic effort is rightly stressed; and interesting details are given of the way in which operations on these lines were performed six years ago in Greater Berlin. *E. E. A.*

SERGENT (Et.). Sur l'utilisation du vert de Paris comme larvicide en Algérie. [**Employment of Paris Green as a Larvicide in Algeria.**] —*Arch. Inst. Pasteur d'Algérie.* 1932. Sept. Vol. 10. No. 3. pp. 356–358.

For two years comparative tests have been made on the commonest types of Anopheles breeding places in Algeria, using Paris green (aceto-arsenite of copper, otherwise known as Schweinfurth's green) and petroleum respectively as larvicides. Employing a 2 per cent. mixture of Paris green in fine sand or dust, 50 grams are barely sufficient for the treatment of 1 square metre of water surface; in order to obtain a result, it has often proved necessary to use amounts decidedly larger than those laid down by certain authors—about 5 kilos per hectare, or 11 lb. per 2½ acres. For small scale work the operator stands with his back to the wind, and throws the powder by hand or from a saucepan. Since Anopheles pupae, which succumb to oil, are unaffected by Paris green, the use of the latter must be repeated more frequently than that of petroleum. For this and other reasons, in Algeria at any rate, although the cost of the two methods is about the same, Paris green as a mosquito larvicide appears to be of less practical value than oil. *E. E. A.*

SERGENT (Et.), CATANEI (A.), TRENSZ (F.) & SERGENT (A.). Expérience de destruction des anophèles au moyen des gambouses dans un barrage-réservoir algérien. [**Experimental Destruction of Anopheles in an Algerian Reservoir by means of Top-Minnows.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. June. Vol. 10. No. 2. pp. 153–156. With 7 figs. (6 on 5 plates).

The dam was closed on 15th April, 1931, and the reservoir, which occupied an area of 1 hectare (nearly 2½ acres), filled in a few days. Several hundred top-minnows (*Gambusia* sp.) were turned in forthwith, and 200 or 300 more were introduced each week until July. Culicine and Anopheline larvae made their appearance between 4th and 26th May, during which period the top-minnows had not had time to multiply to any great extent. On 27th May 25 litres of oil were applied along the eastern border of the reservoir, and by 30th May Anopheline larvae had completely disappeared. By 5th June the top-minnows were becoming steadily more numerous, while the Culicine larvae showed progressive reduction in numbers until, with the advent of the hot weather, they vanished altogether. Had it not been for the presence of the little fish, the Anopheles larvae would have had to be got rid of by means of larvicides, employed at frequent and regular intervals. The splenic index of the native tribe near the reservoir, which was 3·4 in March, 1931, fell to 0 in November of the same year, at the conclusion of the experiment. *E. E. A.*

SERGENT (Etienne). Essai de peuplement d'une rivière d'Algérie (la Réghaia) par les gambouses. [**Stocking an Algerian River with Gambusia.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. Sept. Vol. 10. No. 3. pp. 348–355. With 13 figs.

An account of how an Algerian river was stocked with fish, *Gambusia holbrooki*, for three consecutive seasons, with the disappearance of the malaria-carrying *A. maculipennis.*

Gambusia was introduced into Algeria in 1926 and it has been found easy to stock stagnant waters with it. The more important breeding places are wadis and drainage canals, with swift current in winter and drying into pools in summer. The wadi concerned in the experiment is 30 kilos long and runs north from the Atlas mountains to the Mediterranean. In the winter its valley is flooded and reedy pools are left on the banks. At the end of summer *A. maculipennis* is very numerous and malaria affects all the farms. The fish were put in about 50 at a time at several points every two or three weeks from May to October. It is necessary to restock in the spring because in the narrower parts where the water is high the fish are carried away by the current. At other points restocking is unnecessary. It was found that the fish were able to penetrate the felted mass of vegetation which formed on the surface of water where larvae had been very numerous, that they devoured the larvae but were able themselves to shelter from larger predatory fish, which are numerous in the river. The conclusion reached is that one can stock such a river with gambusia and that they are effective in destroying anopheles larvae. *A. G. B.*

WOODS (T. F. M.). **Two Simple Anti-Mosquito Measures.**—*Jl. Roy. Army Med. Corps.* 1932. Dec. Vol. 59. No. 6. pp. 450–452. With 1 fig.

(1) deals with borrow pits which are too deep to drain and too big to fill in. In the monsoon they become filled with water which breeds mosquitoes for many months. A wall or bund 2 feet high by 3 feet wide is built round them which prevents drainage from the surrounding ground. Water collecting in the pits is dealt with by levelling with a slight fall to one end where a pit 4 × 4 × 4 yards is made. In this, which can be surrounded by another wall, the water is easily treated with oil or Paris green. This method has been used with great success at Sialkot in the Punjab.

(2) is a method of oiling slowly running water.

"Ordinary Quaker oats tins, which have air-tight lids, were obtained free from the canteens. These tins were filled with oil and a few stones to make them sink. When required for use they were punctured at the top and bottom by means of a hammer and a nail and thrown into the upstream end of slowly flowing water. Oil which escapes from the tins and slowly spreads an even film over the surface of the water is replaced by water. It is claimed for this method of oiling that it is clean and economical."

A. G. B.

Gordon (R. M.), Hicks (E. P.), Davey (T. H.) & Watson (M.). **A Study of the House-Haunting Culicidae occurring in Freetown, Sierra Leone; and of the Part played by them in the Transmission of Certain Tropical Diseases, together with Observations on the Relationship of Anophelines to Housing, and the Effects of Anti-larval Measures in Freetown.**—*Ann. Trop. Med. & Parasit.* 1932. Oct. 29. Vol. 26. No. 3. pp. 273–345. With 5 graphs & 2 maps. [42 refs.]

Part I. A survey of the house-haunting Culicidae in Freetown and Kissy.—Kissy is a native village with some 2,000 inhabitants on the coast six miles from Freetown. The climate of the two places is the same, but the general sanitation of Kissy corresponds with that of Freetown thirty years ago. In Freetown the survey was made during the wet season (June to November inclusive) of 1930 and 1931; in this time daily visits between 7 and 9 a.m. were made by one or other of the authors to 3,587 rooms, chiefly in the poorer type of house. The survey was later extended to Kissy and there carried out at all seasons of the year. A total of 5,371 mosquitoes (141 Culicines and 5,230 Anophelines) were captured. During the rainy season in Freetown the Culicine concentration per room was 0·03 and in Kissy 0·13 (the corresponding figure for Lagos being 1·79). The Anopheline concentration was 0·4 in Freetown and 10·5 in Kissy (the corresponding figure for Lagos being 6·3). *A. costalis* was almost the only species of Anopheles taken in houses in Freetown; in Kissy there were about equal numbers of *A. costalis* and *A. funestus*, the latter being in slight excess, and in addition a very few *A. rhodesiensis* and *A. nili*. The species of Culicines taken are also recorded in detail, and it is shown that of the 141 individuals caught in Freetown only 9 (*i.e.* 1 in 15) were "potential carriers" of yellow fever. For comparison a collection was made of mosquitoes taken in the act of sucking blood out of doors. The numbers studied in this way were small, but the dominant Anophelines in Kissy were now *A. theileri* and *A. mauritianus* and the Culicines in Freetown showed a proportion of "potential carriers" of yellow fever of 1 in 5. The results of collections from rooms must therefore be interpreted with caution. The monthly Anopheline incidence in houses in Freetown shows a maximum of 1 per room in August (the height of the wet season) and almost complete absence in the dry season. In Kissy the maximum (23 per room) is also in August and the dry season incidence about 2 per room. When the monthly collections of *A. costalis* and *A. funestus* are considered separately, the *costalis* maximum (13 per room) is reached in July, but the *funestus* maximum (16 per room) is not attained until September. A similar observation has been made by Taylor in Nigeria. The authors emphasize that whereas the Anopheline catches are probably fairly representative of the house-haunting individuals, the Culicine catches are not representative either as regards species or numbers.

Part II. Results of dissection of house-haunting Anophelines occurring in Freetown and Kissy.—The infectibility of *A. costalis* and *A. funestus* by *P. falciparum* was demonstrated experimentally (for the first time in the case of *A. funestus*). Complete development of *W. bancrofti* in both species has already been recorded by HICKS [*ante*, p. 226]. The technique for a complete dissection to demonstrate plasmodia and filariae is then described. This was carried out on 3,267 of the 4,818 female Anophelines collected in Freetown and Kissy. The percentage infections with malaria in Freetown were: *A. costalis*, 11·1; *A. funestus*, 12·5 (eight dissections only); and in Kissy: *A. costalis*, 16·3; *A. funestus*, 7·0; *A. nili*, 27·3 (22 dissections only); *A. rhodesiensis*, 0. In the case of filaria the figures for Freetown were: *A. costalis*, 5·1 per cent.; *A. funestus*, 25 per cent. (eight dissections only); and for Kissy: *A. costalis*, 14·6 per cent.; *A. funestus*, 8·0 per cent.; *A. nili*, 4·5 per cent. (22 dissections only). From the observations recorded in Part I, the authors conclude that Culicines are of negligible importance as carriers of *W. bancrofti* in comparison with the Anophelines. The results here recorded are compared with published data from other parts of West Africa, all of which tend to show that *A. costalis* and *A. funestus* are the only two species of importance.

As regards the seasonal incidence of the infections, the malaria infection rate is similar in the wet and dry seasons, but the filaria rate is twice (in *A. costalis*) and eight times (in *A. funestus*) as great in the wet season as it is in the dry. Since the maximum and minimum temperatures show little difference, it is suggested that the low relative humidity (66) in the dry season is prejudicial to the development of the filaria in the mosquito. The relative ages of Anophelines caught at different seasons were estimated by PERRY's method of noting the stage of deterioration of their wing scales. In both localities old Anophelines predominated in the dry season, young Anophelines during the rains. In the case of malaria, the percentage infection increased from 4·7 in Grade I (the youngest) to 25·0 in Grade IV (the oldest), but the greatest total number of infections occurred in Grade II. In the case of filaria, both the infection rate and the total number of infections were highest in Grade II. Thus the percentage of infected insects does not increase with age in filaria as it does in malaria, doubtless because the infection of an individual mosquito with filaria is of much shorter duration. Perry's Grade II thus constitutes the most important class of Anophelines.

In West Africa, the gametocyte carriers are almost entirely confined to children. But the authors find no correlation between the number of children in a house and the infection rate amongst the Anophelines captured therein. This suggested that the Anophelines do not remain long in a given house. By means of staining experiments it is proved that they nearly all leave a native house within 24 hours of having fed, and very few return. As regards the type of house and the incidence of Anophelines, it was found that the badly-lighted houses contained almost four times as many per room as well-lighted houses in the same vicinity, but "this does not necessarily indicate that fewer Anophelines enter well-ventilated houses, but rather that they leave them at an earlier hour."

Part III. The history of, and some observations on, anti-mosquito measures in Freetown.—The favourable conditions obtaining in Freetown as compared with Kissy revealed by the observations recorded in Parts I and II are attributed to the anti-malarial measures carried out in Freetown during recent years; the history of the advances made since 1899 is fully set forth. An extensive scheme of permanent works estimated to cost some £60,000 was planned in 1930, but was abandoned in 1931 through lack of funds. The authors were able, however, to compare conditions in certain streets in which no modern drainage had been attempted before their first visit in 1930 with conditions in the same streets in 1931 after drainage had been completed. There was a marked reduction in the number of Anophelines.

V. B. Wigglesworth.

URBINO (C. M.) & LAUREL (A. G.). **Preliminary Report on Larva and Adult Densities of Stream-Breeding Anophelines.**—*Monthly Bull. Philippine Health Serv.* 1932. Oct. Vol. 12. No. 10. pp. 555–576. With 11 charts, 7 plates & 1 sketch map.

The work of which an account, largely in the form of charts and tables, is given in this paper was carried out at Bulacan, Luzon, Philippine Is., from January, 1930 to June in the following year. It concerns *Anopheles funestus* (= *A. minimus*), *A. aconitus* var. *filipinae*, and *A. barbirostris*, species which breed chiefly in streams, and also includes *A. maculatus*. Five streams affording typical *A. funestus* breeding places were selected for study; from a definite length, generally a kilometre, of each of these, dippings were taken once a week with a dipper of standard dimensions. In tabular form, " Larva density is expressed by the average number of larvae per dip by species, or the total of the average number of larvae per dip from the five streams . . . . adult density is expressed by the total number of adults by the month from the human baited traps . . . . and by the total field catches from the stations around animals . . . . " For 1930, correlation coefficients are given of larvae and adults of the same species; of larva density and rainfall and stream level; and of larva density and trap catches of adults. With one exception (*A. maculatus*), larvae were found to be " directly proportional to their corresponding adults " ; it is suggested that the imperfect correlation shown by *A. maculatus* may be due to the increased breeding of this species during the rainy season in places other than streams. On the other hand migration of the adults may sometimes be a disturbing factor. In the case of all stream breeding Anophelines, stream water level, owing to the devastating results to larvae of effective flushing, has an effect on larva density more inverse than that of the total monthly rainfall. Nevertheless " heavy continuous rainfall " may be of importance in reducing adult density, since it may actually kill adult mosquitoes, prevent them from reaching a host, or diminish larva density by causing the flushing of streams. In connexion with mosquito migration, the authors' experience has been that " wind is an important factor," and they add that " There must be an optimum wind velocity during which mosquito migration is most favourable." *E. E. A.*

BOYD (Mark F.). **Methods for the Manipulation and Conservation of Anopheline Imagines.**—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 839–844. With 3 figs.

This paper deals with the manipulation of Anopheline mosquitoes for purposes of malaria therapy. Insects that are developing infection are kept in a cool incubator (20°–22°C.). After they become infective they are stored in a Frigidaire at a temperature varying from 2°–17°C.

They are kept in cages about 6 ins. by 3 ins. made of starched bobbinet supported on a metal frame, by which means the condensation of water on metal or glass surfaces is avoided. They are transferred by means of a special catching apparatus, consisting of a test tube secured over one tine of a spring forceps and a sliding lid placed over the other tine. The small cages have self closing covers made of sheet rubber with a short slit in it. The infective mosquitoes employed for inoculation purposes are placed in small containers made of flanged wooden rings covered with squares of bobbinet held in place by rubber bands ; a series of such rings can be placed in an ordinary petri dish holder. *V. B. Wigglesworth.*

BOYD (Mark F.). **A Note on the Preparation of Anopheline Dissections for Examination.**—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 836–838.

The author advocates examining gland preparations in a fresh moist condition, but prefers to fix and stain all dissected stomachs before they are examined. These are fixed to the slide or coverslip with Bouin's fixative and stained with Mayer's acid haemalum.

V. B. Wigglesworth.

MER (G.). **The Determination of the Age of** *Anopheles* **by Differences in the Size of the Common Oviduct.**—*Bull. Entom. Res.* 1932. Dec. Vol. 23. Pt. 4. pp. 563–566. With 1 fig.

Unless the life of a female Anopheles is longer than the time taken by the parasite to complete its sexual cycle, the insect obviously (the author says " theoretically ") cannot transmit malaria. The length of life of Anophelines at different seasons of the year is therefore an important factor in connexion with the epidemiology of the disease, but hitherto attempts to determine the age of malaria-carrying mosquitoes have dealt chiefly with laboratory-bred specimens, which are little to the purpose. Ovarium differences, noted by CHRISTOPHERS in 1911, are of but limited avail in distinguishing old from " new " female Anopheles, but the changes in the size of the two dilatations, or ampullae, in the common oviduct, which occur during gravidity and persist after egg-laying, afford a surer guide. The author, whose observations were made at Jerusalem on overwintering and captured females of *Anopheles elutus* Edw., gives comparative measurements of the ampullae, and describes his technique. " In most cases," we are told, " exact measurement is not necessary, the difference being quite obvious to a trained eye." *E. E. A.*

BOYD (Mark F.) & CAIN (Thomas L.), Jr. **On Large Scale Rearing of** *Anopheles quadrimaculatus* **in Captivity.**—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 832–835.

Some improvements on previously described methods for rearing Anopheles larvae are reported, which result in a lower mortality in the early stages and increased size and vigour of the imagines. The main points are (i) maintenance of the water at a constant temperature (70°F. for *A. quadrimaculatus*) ; (ii) provision of abundant and evenly distributed food by supplementing the diet of Fleischmann's yeast with a rich hay infusion ; and (iii) securing a uniform distribution of larvae and pupae over the water by scattering chaff on the surface. This affords equal opportunities of feeding to all the larvae and obviates cannibalism. Under these conditions metamorphosis from egg to adult required about 21 days. *V. B. Wigglesworth.*

ANDERSON (Drysdale). *Anopheles mauritianus* **as a House Haunter.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. p. 408.

One day in October, 1932, in the enclosed and partially screened verandah of the writer's bungalow at Onitsha, Nigeria, S.P., half a mile from a flooded river, there were found forty-one females of *A. mauritianus*, nine of which belonged to var. *ziemanni*, and the remainder to var. *tenebrosus*. None of the usual house haunters such as *A. costalis* (=*A. gambiae*) were caught, and during the previous five months, in routine catches made in the house every other day, only seven specimens of this species (one *A. mauritianus* var. *paludis*, and six *A. mauritianus* var. *tenebrosus*) had been taken. *E. E. A.*

RUSSELL (Paul F.) & SANTIAGO (Domingo). *Anopheles minimus* **Larvae from Wells in Laguna Province, Philippine Islands.**—*Philippine Jl. Sci.* 1932. Oct. Vol. 49. No. 2. pp. 219–223. With 3 figs. on 1 plate.

Larvae of *Anopheles minimus*, the chief malaria-carrier in the Philippines, which normally breeds at the edges of streams, were discovered in surface wells in Laguna Province, Luzon, Philippine Islands. Since larvae of this species always occur in large numbers in streams, but appear to be relatively scarce in wells, the latter would not seem to be of much local importance in connexion with malaria. It is pointed out that the case may be otherwise where a well-marked dry season causes the stream breeding places of *A. minimus* to disappear, and that further investigation is needed. *E. E. A.*

ROUBAUD (E.), COLAS-BELCOUR (J.) & GASCHEN (H.). Etude du comportement sexuel comme caractère génétique chez l'*Anopheles maculipennis*. [**A Study of Sexual Behaviour as a Genetic Character in** *Anopheles maculipennis*.]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 27–29.

This paper is concerned with the two forms of *A. maculipennis* found in Holland though as yet not in England, in connexion with which Roubaud in a previous contribution introduced the terms Eurygamy and Stenogamy (see this *Bulletin*, 1932, Vol. 29, pp. 831–832). While the eurygamous, typical form, which is large and has long wings, will not mate in a confined space, but must needs make a nuptial flight as a preliminary to copulation, the small Dutch variety called *atroparvus* is stenogamous, and breeds freely in cages of very limited dimensions. In Holland, BUCK, SCHOUTE and SWELLENGREBEL, who succeeded in crossing the two forms, found that in a confined space the only means of obtaining fertilized females of the large form was to enclose with them males belonging to the other. Using females of the large form, of Dutch origin, and stenogamous males of Norman stock, the present authors have repeated this procedure at the Institut Pasteur, Paris, in order to observe the fate of the eurygamous character in the cross thus produced. At the outset, more than one hundred specimens of both sexes of the large form, from eggs laid by wild-caught females imported direct from Holland, were kept together in the same cage for nearly two months and fed on guineapigs; no fertile eggs were obtained, and repeated dissections showed no evidence of fertilization having taken place. Some ten of these eurygamous and homodynamous females were then placed in a cage with males of the above-mentioned, stenogamous and heterodynamous Norman stock. Fertilization was affected without difficulty. The adults of the resultant first cross generation mated in normal fashion, in a cage one-twentieth of a cubic metre in size, and the females laid several batches of fertile eggs. The eurygamy of the Dutch stock therefore appeared in the guise of a Mendelian *recessive*, the stenogamy of the Norman form in that of a *dominant* character. But although the adults of the second mixed generation, which emerged in August, were kept together in a cage from 16th August until 6th October, not a single batch of fertile eggs was laid. It was not possible to pursue the experiment further on Mendelian lines, but we see that eurygamy, latent in the first mixed generation, reasserted itself in the second, thus coming within the category of Mendelian genetics. *E. E. A.*

MACGREGOR (Malcolm E.). **The Occurrence of Roubaud's "Race Autogène" in a German Strain of** *Culex pipiens* **in England: with Notes on Rearing and Bionomics.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 307–314.

In 1929 ROUBAUD, working in France, recorded the occurrence of what he termed an "autogenous" race of the common gnat or mosquito (*Culex pipiens*). Provided that the temperature of its environment does not sink lower than 16° to 18°C., this race continues to breed throughout the year, and moreover in its case a meal of blood is not a necessary preliminary to the laying of fertile ova. A batch of adults, descended from a consignment of larvae and eggs of *C. pipiens* received by the author from Germany, was fed upon a weak solution of honey, and four days after emergence produced several egg-rafts. The latter were smaller and less symmetrical than rafts laid by *C. pipiens* out-of-doors, and contained less than half the number of eggs present in the normal raft; but, when placed on "rich hay infusion," with or without the addition of rabbits droppings, and kept at a temperature of between 23° and 28°C., larvae which attained a large size were produced in quantity. From these were obtained many large adults, which four days later deposited quantities of the small, asymmetrical egg-rafts. In this way, in the autumn of 1932, an "autogenous" race of *C. pipiens*, producing a fresh generation every nineteen or twenty days, was established in the Wellcome Entomological Field Laboratories, at Wisley, Surrey.

The author failed to produce an "autogenous" strain by supplying dilute honey-solution to the vigorous adult progeny of wild-caught English *C. pipiens*, since no eggs were laid; hence he concludes that "the British race of *C. pipiens*, in this locality at any rate, is not capable of 'autogenous' development." On the other hand, as previously indicated by ROUBAUD, newly emerged females of the "autogenous" race deposited small egg-rafts without the aid of honey or any other food, but in no case did females of the British race lay eggs when kept solely on a fruit diet. In November, the sexes of *C. pipiens* were observed to mate freely during the late afternoon and evening. Parthenogenesis is apparently impossible; virgin females of the "autogenous" strain, supplied with dilute honey-solution and with water in a dish, and kept constantly at 22°C., laid a few egg-rafts, but all the ova were infertile.

A description is given of the special technique employed with complete success at the Wisley Laboratories for breeding and rearing both the normal and "autogenous" strains of *C. pipiens* throughout the year. "At a standard atmospheric temperature of 22° to 25°C. coupled with a high level of atmospheric humidity," 80 to 100 per cent. of the females feed to repletion on birds as soon as opportunity is offered. When females of the "autogenous" race were fed on blood prior to oviposition, the egg-rafts subsequently laid were no larger than those of the small "autogenous" kind. On the other hand a meal of blood *after* the laying of the latter type of rafts resulted in very much larger rafts, which, however, were composed of fewer eggs than those contained in normal *C. pipiens* rafts. The "autogenous" faculty was found to be firmly established in the foreign race, and to be manifested by females of the sixth generation, even when those of the previous five generations had been fed on blood.

The paper affords some measure of the loss sustained by medical entomology through its author's untimely death in January, 1933.

E. E. A.

DJAPARIDSE (P. S.). *Stegomyia fasciata* (=*Aedes argenteus*) in Kutais. [*Ae. aegypti* **in Kutais, Georgia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 608–609.

The carrier of yellow fever and dengue is found on the shore of the Black Sea from Batum to Gagri and in September 1929 and 1930 the author found it in quantity in the town of Kutais, which is 110 kilometres from the nearest port. The introduction of yellow fever is improbable but dengue might easily be brought in from Greece.

A. G. B.

BODE (H. G.). Zur Kenntnis atypischer Mückenstichreaktionen (*Culicosis bullosa*). [**Atypical Reactions to Gnat Bites.**]—*Dermat. Woch.* 1933. Jan. 7. Vol. 96. No. 1 pp. 7–13. With 2 figs.

An affection of the skin, characterized by large vesicles containing serous fluid, occurring only during the summer months and on exposed parts of the body, has been described by SIEMENS [this *Bulletin*, Vol. 29, p. 843] under the name Culicosis bullosa and ascribed by him to mosquito bites. This rare condition is here reported in two sisters who had suffered for three consecutive summers. The formation of vesicles was produced experimentally by the bites of *Culex pipiens*; though not by intradermal injection of an emulsion of their bodies. The condition is regarded as an allergic reaction occurring in skin which has become highly sensitized. *V. B. Wigglesworth.*

ENGELHARDT (W.). Ueber die Ursachen atypischer Mückenstichreaktionen. [**The Causes of Atypical Reactions to Mosquito Bite.**]—*Arch. f. Dermat. u. Syph.* 1933. Jan. 20. Vol. 167. No. 2. pp. 307–314. [11 refs.]

Two cases of the unusual type of reaction to mosquito bite known as Culicosis bullosa are described. These cases showed isolated vesicles on the legs, many of them as large as cherries but with no inflammation of the surrounding skin and causing very little irritation. In both cases cultures from the contents of the blebs yielded budding fungi. A study of the literature suggests that there are two types of reaction to mosquito bites in which vesicles are formed: (i) that described above where the vesicles are very large and isolated and associated with almost no irritation; this condition Engelhardt believes to be caused by yeast fungi from the crop of the mosquito being injected into the wound and not by sensitization of the skin to the poison of the mosquito; (ii) cases where small vesicles develop in an area intensely swollen and inflamed as the result of many bites in a restricted space; this condition he attributes to the excess of poison injected by the mosquito coupled with the subsequent rubbing and scratching. To what extent an allergy of the skin contributes to these reactions is at present undetermined. *V. B. Wigglesworth.*

PARROT (L.). Nouvelles observations sur la biologie de *Phlebotomus papatasi* (Scop.). [**Biology of** ***P. papatasii.***]—*Arch. Inst. Pasteur d'Algérie.* 1932. Sept. Vol. 10. No. 3. pp. 407–409. With 2 figs. on 1 plate.

Larvae of Phlebotomus are known to feed mainly on organic detritus and on unicellular algae. Parrot finds that larvae of *P. papatasii* will thrive on a diet of dead leaves (from elm, plane, etc.) without any other source of nitrogen, though they will not eat fresh leaves. The larger larvae devour the entire substance of the leaves with the exception of the veins. He records also a few observations showing the increased rate of development at artificially raised temperatures.

V. B. Wigglesworth.

PAWLOWSKY (E. N.), STEIN (A. K.) & PERFILJEW (P. P.). Experimentelle Untersuchung ueber die Wirkung des Phlebotomusstiches auf die Menschenhaut. [**The Effect of Phlebotomus Bite on Human Skin.**]—*Ztschr. f. Parasitenk.* 1932. Nov. 18. Vol. 5. No. 1. pp. 1–13. With 8 figs. [34 refs.]

The first half of this paper is a fully documented account of the present state of knowledge on the mechanism of biting in Phlebotomus, the structure of the salivary glands and the effects of the bite. In the second half, original observations on the effects of the bite are given. Well marked reactions accompanied by intense itching were obtained in subjects who had never been bitten by Phlebotomus before; therefore the effects of Phlebotomus bite cannot be due *solely* to allergy resulting from previous sensitization. Several of the resultant papules were excised and studied histologically; the horny layer showed marked swelling with separation of the cells; the vessels of the corium were dilated and surrounded by an infiltration of leucocytes (in one case largely made up of eosinophils) and lymphocytes. These observations indicate that Phlebotomus bite causes an acute inflammation.

V. B. Wigglesworth.

MYERS (J. G.). **Report on the Sandfly** (*Culicoides*) **Investigation in the Bahamas.**—18 pp. [Received from Colonial Office November 12, 1932.]

With the rise of the tourist trade in New Providence, the "sand-fly," *Culicoides furens*, has become a factor of considerable economic importance by reason of the annoyance caused by its bite. The breeding of this species is probably almost confined to certain restricted coastal mangrove swamps (the precise location of which is reported) where the sand is mixed with humus, well shaded, and water-logged with salt or brackish water. The females bite chiefly about sunrise and sunset (but in dense shade they will bite at any hour) particularly on still, sultry nights following rain, with a temperature of 80° or higher. The only sound method of eliminating the " sand-fly " is to fill in or dredge out the swamps in which it breeds, which in itself would be a desirable step in the development of the island. Failing this, great reduction could probably be secured by clearing completely all vegetation which shades the water-logged soil and so exposing it to sun and wind. As a palliative measure the use of bed nets is advocated, the author regarding " as pure superstition the belief that a net of common cheesecloth, slung well above the bed, excludes so much air as to cause discomfort." Protection may also be secured by spraying the mosquito screens with kerosene in which has been steeped pyrethrum powder at the rate of a quarter of a pound in 3 pints of kerosene. The best-known chemical deterrent is oil of pennyroyal, and this may be mixed in equal parts with the coconut oil used against sunburning. In experiments during a heavy infestation it was found that a limb treated with this mixture remained in comfort for two hours, while the state of the other was almost intolerable. To alleviate the after-irritation of the bites, either wood alcohol or 7 per cent. ammonia water is highly effective. *V. B. Wigglesworth.*

HALL (David G.), Jr. **Some Studies on the Breeding Media, Development, and Stages of the Eye Gnat** *Hippelates pusio* **Loew (Diptera : Chloropidae).**—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 854–864. With 8 figs. [14 refs.]

The eye gnat, *Hippelates pusio*, is one of the factors limiting development of the Coachella Valley, California , causing much annoyance from its habit of feeding around the eyes and nose of man and animals and being responsible for the prevalence of conjunctivitis, especially among children of pre-school age. In nature the larvae were found in decaying meat, in excrement, and in decaying fruit and vegetables. In the laboratory human excrement proved to be the most favourable medium for rearing larvae, the life cycle from egg to adult varying with the conditions from 11 days to more than 3 months. These observations suggest that the problem of controlling the eye gnat is one of sanitation as well as one of agricultural practice. All stages of the insect are fully described and illustrated.

V. B. Wigglesworth.

PATTON (W. S.). **Studies on the Higher Diptera of Medical and Veterinary Importance. A Revision of the Species of the Genus** *Musca* **based on a Comparative Study of the Male Terminalia. I. The Natural Grouping of the Species and their Relationship to Each Other.**—*Ann. Trop. Med. & Parasit.* 1932. Oct. 29. Vol. 26. No. 3. pp. 347–405. With 26 figs. [29 refs.]

On the basis of an exhaustive study of the male terminalia (genital armature) of forty-one out of forty-four species of *Musca* known to him, the results of which are here given, the author considers that he has succeeded in establishing the relationships of the species, in correcting certain errors in determination previously made by him, and in fixing the identity of species so definitely " that any one can determine them for himself with certainty." Patton finds that the species of *Musca*, according to the characters afforded by the male terminalia (paramere, phallosome, anal cerci and lateral processes of the fifth ventrite) are naturally divisible into three groups, respectively designated by him *domestica*, *sorbens* and *lusoria*, according to the trivial name of the oldest species in each group. In the first-mentioned group, *M. planiceps*, although in other respects highly specialized, since it both sucks blood and is larviparous, depositing a third-stage larva, is nevertheless, according to the characters afforded by phallosome and paramere " one of the simplest forms . . . closely related to *domestica* and its allies." In the *sorbens* group *M. conducens*, a haematophagous species, which, however, must perforce depend for its food on the prior activities of other blood-sucking flies, is of interest as illustrating an early stage in the evolution in the genus *Musca* of a proboscis capable of drawing blood. The *lusoria* group, which consists of twenty-three species already known to the author, includes *M. autumnalis* and other serious pests of farm stock.

The greater portion of the latter part of the paper is devoted to a discussion of previous attempts to divide the genus *Musca* into natural groups. [This is not the place in which to debate the question whether the characters afforded by the male terminalia are, for the purpose of deciding as to the natural grouping of species, really of overriding value. It may, however, be said that it is not easy to see why, in the evolution of the terminalia as in that of other structural details, convergence should not have played a part. The author announces that he has long been preparing a revision of the Stomoxys group, and that, having " examined the male terminalia of many species of seven of the genera," he has " come to the conclusion that there is only one genus here, and that that must be the oldest, Stomoxys." In lists which follow a few pages later, practical expression is given to this conclusion. We venture, however, to prophesy that the death warrants of *Lyperosia*, *Haematobia*, *Stygeromyia et haec genera omnia* will not be so easily signed.] *E. E. A.*

FORD (Norma). **Observations on the Behaviour of the Sarcophagid Fly,** *Wohlfahrtia vigil* **(Walk.).**—*Jl. Parasitology.* 1932. Dec. Vol. 19. No. 2. pp. 106–111.

If Miss Ford's very interesting observations, made upon five adult specimens, are to be regarded as conclusive, *Wohlfahrtia vigil*, a frequent cause of cutaneous myiasis in infants and other young mammals in North America, definitely belongs to the number of those myiasis-producing flies, which, in nature, are invariably parasitic in the larval stage.

Two males and one female of *W. vigil*, from larvae removed from an infant of four months and reared artificially on liver, manifested complete indifference to the latter substance either fresh, stale or rotten, but fed all day upon a particular lump of sugar. In a cage measuring 3 by 2 by 2 ft. mating took place three days after emergence, and the female, after depositing at intervals three batches of larvae, died of senile decay at the age of 53 days. Five days after the female had mated, either a guineapig or rabbit was placed in the cage daily for periods of half-an-hour, an hour, or two hours at a time. Initial indifference on the part of the fly was followed by awakening and increasing interest, and repeated attempts, often successful, to reach or alight on the animal's head, the eye appearing to be the point of attraction; no notice was taken of shaved areas or abrasions on the body. On the afternoon of the eighth day after mating, "when a guinea-pig was put in the cage, *W. vigil* immediately lit on the head close to the eye, and poured out a stream of white larvae . . . . The stream resolved itself into actively moving maggots which in a few seconds disappeared among the long hairs." A second mating (with a male of the second generation) took place when the female was forty-one days old, and eight and nine days later small batches of larvae were found on two pieces of liver; but this was only after repeated futile attempts on the part of the now aged and decrepit fly to crawl up the animals.

The author thinks it probable that, when an infant is the victim of *W. vigil*, larviposition takes places on the cheek, whence the larva migrate in various directions and then burrow into the skin. She states that "in the cases with infants recorded in Ontario the larvae have entered the skin most commonly on the neck, chest, shoulders, arms, cheeks, and eyelids." She also considers that the action of her captive flies in spurning the supposed attraction of meat or carrion, and restricting themselves to a diet of unobjectionable sugar, clearly shows that it is not necessary for a baby to be in an uncleanly or neglected condition in order to secure the undesirable attentions of a female *W. vigil*. Apart from the interest of the primary observations, this excellent account of the behaviour of *Wohlfahrtia vigil* in captivity, including the playful antics of the males, is well worth reading.

E. E. A.

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van Slype (W.). Trois cas de myiase intestinale à *Apiochoeta scalaris*. **[Three Cases of Intestinal Myiasis due to** *A. scalaris*.]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 581–582.

Among 341 stools from native patients in the hospital at Lomami, Belgian Congo, 3 showed eggs of Arthropods. Placed on agar-agar, these eggs proved viable and yielded larvae of *Apiochoeta scalaris*.

V. B. Wigglesworth.

Pomeroy (A. W. J.) & Morris (K. R. S.). **The Tsetse Problem on the Eastern Cattle Route in the Gold Coast. (With an Appendix by K. R. S. Morris on an Ecological Study and Experimental Clearing at Makongo.)**—*Bull. Entom. Res.* 1932. Dec. Vol. 23. Pt. 4. pp. 501–531. With 8 figs., 3 maps (1 coloured folding) & 2 plates. [12 refs.]

The work of which an account is given in the joint paper is summarized by the authors as:—"(*a*) An investigation into the possibilities and economic value of controlling tsetse in certain areas of the Northern Territories of the Gold Coast; (*b*) the application of control measures; (*c*) a careful study of the effect of the measures undertaken."

In the Gold Coast down to the end of 1925, when research into the twin problems of tsetse-flies and trypanosomiasis was definitely initiated, the veterinary rather than the medical side of the problem was held to be the more important, and conditions on the main route used by cattle proceeding from the Haute Volta (French territory) to Kumasi, in Ashanti, accordingly became the subject of investigation. Information acquired during the course of the work seemed, however, to indicate that the local importance of human trypanosomiasis may have been underrated, and a description of an experimental clearing at Makongo, where sleeping sickness is endemic, is furnished in the Appendix.

As regards cattle, it was in the first place necessary to determine whether or not the animals were already infected with trypanosomiasis before crossing the French border. By means of an extensive series of blood-examinations it was found that, whereas " the infection rate at the border was very low, at Yeji [on the Volta River, half way to Kumasi] there was a marked increase in infection, while at Kumasi, the distributing market for cattle, the infection rate had increased by as much as 60 per cent. in the wetter months." There could thus be no doubt as to the side of the border on which the trouble lay, and with the help of funds furnished by Government experimental clearings were made at a number of tsetse-infested points (river crossings, shown on the coloured map) on the cattle route. The result, corroborated by a remarkable reduction in the number of immigrant cattle showing trypanosomes in their blood, is the establishment of definite control of tsetse-flies in the cleared areas, and should do much to hearten those engaged in similar tasks elsewhere.

The trypanosomes found in the cattle, as determined by the pathologists of the Gold Coast Tsetse staff, were *Trypanosoma vivax*, *T. congolense*, *T. brucei*, *T. tragelaphi* and *T. theileri*. The first-mentioned species predominated, and in 1929 at the Nasia River crossing, which before clearing was " by far the densest fly belt " (*Glossina tachinoides*), this trypanosome was the one most commonly found in dissected flies. It was also met with at that time in the blood of game killed in the immediate vicinity of the cattle route ; but in the following year, after clearing had been effected, the same number of examinations revealed no pathogenic trypanosomes, " showing that the cattle-fly-game circle of infection was now broken."

On the northern portion of the cattle route *Glossina palpalis* and *G. tachinoides* were the only species of tsetse of economic importance, and at points where rivers were crossed by the road it was resolved to clear the banks when these flies were found. " In order to facilitate the carrying out of the work by non-technical officers, a standard method was adopted for clearing at all points. The bush was completely cleared for a distance of half a mile along the river on either side of the point of the cattle crossing and the clearing was limited to a width of 20 yards on each bank. The work was undertaken by the District Commissioners in charge of the areas." Descriptions are given of the respective clearings, and their results upon the incidence of tsetse ; the re-growth, usually of a character very different from that of the original vegetation, is also described. Owing to the varying nature of the re-growth of vegetation after clearing, and the resultant effect as regards the reintroduction of tsetse, the vital importance of a preliminary study of the plant community, as well as of the fly community at each place is emphasized. Contrasts are afforded by two extreme cases—the Tamne River and the Makongo clearings. In the former, while during the first year there was no re-growth worth mentioning, during the second year clumps of *Mimosa asperata* resulting from water-borne seeds from up-stream, with the addition of a few shrubs and a plentiful crop of long grass, " produced a cover sufficient to harbour considerable numbers of *Glossina tachinoides.* At Makongo, eight months after the work of the clearing was finished, a low impenetrable re-growth of swamp-grass, shrubs and creepers had invaded the whole of the cleared areas, forming a plant community apparently inimical to the invasion of tsetse."

In the Appendix, Morris suggests the possibility of securing a riverside clearing against reinvasion by *G. palpalis* and *G. tachinoides* by maintaining re-growth of this kind at each end, and the description calls to mind the thicket-barriers against other species of tsetse with which experiments are being made by SWYNNERTON in Tanganyika Territory. Prolonged inundation on the other hand, if of annual recurrence, *drowns* the stumps of felled trees which would otherwise burst into life afresh, and thus has an inhibiting effect on re-growth. In the Gold Coast, though an area of comparatively small extent, the variety of natural conditions is such, and these factors themselves are so closely interrelated, that it is exceedingly difficult to state the precise requirements of any one of the numerous endemic species of Glossina. While the distribution of these species, like the occurrence of the genus itself, is mainly dependent upon vegetation, " temperature and humidity seem the factors of greatest importance in influencing the metamorphosis of the fly in the pupal state." *Glossina palpalis* and *G. tachinoides*, within the type of plant-environment necessary for their continued existence, appear as regards their distribution to be influenced to a large extent by the presence of certain favoured hosts. The latter in the case of *G. palpalis* are normally wild animals, or domestic stock when easily accessible, while " in certain areas " the authors find reason to believe that " man is definitely the preferred host." *G. tachinoides*, another riverside fly, which nevertheless, where there is water, " seems able to survive in quite open country " without much shade, appears to prey by choice on wild game and reptiles.

In the Appendix, Morris describes and illustrates by means of maps and graphs the striking results on *G. palpalis* of clearing *Isoberlinia doka* woodland from the vicinity of the cattle road at Makongo. The clearing, for the elimination of *G. tachinoides* and *G. palpalis*, of a neighbouring riverside belt of *Ficus congensis* had not proved so successful at the close of the period under observation. *E. E. A.*

TAYLOR (A. W.). **Pupal Parasitism in** *Glossina morsitans* **and** *G. tachinoides* **at Gadau, Northern Nigeria.**—*Bull. Entom. Res.* 1932. Dec. Vol. 23. Pt. 4. pp. 463–467. With 1 fig.

During two years' work in the Sherifuri-Gadau area, 106,047 pupae of *Glossina tachinoides* and 17,346 pupae of *G. morsitans* were collected " in order to provide supplies of ' clean ' tsetse for trypanosome transmission work in the Tsetse Investigation Laboratory, Gadau." A small proportion of these pupae produced other (parasitic) insects instead of tsetse, and the records are tabulated in this paper.

In fighting insect vectors of disease, it is well if the attack can be delivered from more than one direction, with the help of any allies whose services can be secured, and there is something fascinating in the mere idea of controlling one insect by means of another. As regards tsetse-flies, however, the matter has not as yet progressed beyond the stage of preliminary investigation, and an apparently inconclusive experiment by LAMBORN in Nyasaland (1925). As Taylor pertinently remarks :—" Although theoretical objections to applying biological control methods to *Glossina* exist, it may be doubted whether the possibilities of these methods as a means of attaining at least a local degree of control of tsetse have been sufficiently explored." For the biological control of a noxious insect, an effective agent is obviously never to be found on the spot, but must always be imported from elsewhere. Were it seriously intended to experiment with insect parasites for the control of tsetse in Northern Nigeria, it might be worth while to try to import them from Southern Rhodesia, where (assuming that the records are reliable) CHORLEY in 1922–23 found that, at the end of the dry season, no fewer than 84 per cent. of *G. morsitans* pupae from which insects emerged were parasitized, by a Hymenopteron (*Mutilla glossinae*) and by one or more species of Diptera (*Thyridanthrax*) [see this *Bulletin*, Vol. 27, p. 314]. A vastly lower percentage of parasitism is revealed by Taylor's observations in the Sherifuri-Gadau district, and the author finds that "the Bombyliid *Thyridanthrax argentifrons*, Aust., is in this area the only naturally occurring pupal parasite of *Glossina* of any importance. This fly has formed as much as 6 per cent. of total emergences from *G. tachinoides* puparia in the month of March, and 2 per cent. of total emergences from *G. morsitans* puparia for the month of April." *E. E. A.*

JOBLING (B.). **A Revision of the Structure of the Head, Mouth-Part and Salivary Glands of** *Glossina palpalis* **Rob.-Desv.**—*Parasitology*. 1933. Jan. Vol. 24. No. 4. pp. 449–490. With 11 text figs. & 32 figs. on 5 plates. [33 refs.]

Considering the vital importance of the genus *Glossina* to man and beast in Tropical Africa, we have had to wait long for an adequate account of the minute anatomy of the head of a tsetse-fly, and of the organs and structures brought into play when its bite is inflicted. The deficiency has now been remedied by this admirably detailed and beautifully illustrated paper, which is a model of clearness in all respects. In a highly specialized genus like Glossina, the anatomy of the structures dealt with is practically the same throughout ; Jobling compared the head and mouth-parts of *G. palpalis* with those of *G. fusca*, *G. brevipalpis* and *G. morsitans*, and found little difference except in dimensions. [" Mouth-part," both in the title and in a subsequent heading, has a curious appearance shorn of its final " s," and should have received attention while the paper was yet in proof It is also noted that the author, following PETERSON, employs the term " vertex " in a sense different from that in which it is used by Dipterists and other entomologists, and designates what is commonly called the frontal stripe the " mediovertex." This entails the employment of the further term " laterovertex," so that we have " laterovertices " for the parafrontals. In the interests of students, the addition of synonyms to a terminology already sufficient and fairly extensive is to be deprecated.] *E. E. A.*

Hase (Albrecht). Beobachtungen an venezolanischen Triatoma-Arten, sowie zur allgemeinen Kenntnis der Familie der Triatomidae (Hemipt.-Heteropt.). Beiträge zur experimentellen Parasitologie 8. **[Observations on the Triatomidae of Venezuela together with a General Account of the Family.]**—*Ztschr. f. Parasitenk.* 1932. Sept. 5. Vol. 4. No. 4. pp. 585–652. With 27 figs. & 1 folding plate (map). [4 pages of refs.]

The first part of this valuable paper is a review of twenty pages of the present state of knowledge about the Triatomidae. The history of the subject falls into (*a*) the period of pure systematics, (*b*) the period following on Chagas' discovery in 1909 of the transmission of South American trypanosomiasis, during which the parasitological importance of the genera and species was intensively studied, and (*c*) a very recent period during which these insects are being used for studies on insect physiology and ecology. Certain of the gaps in our present knowledge are indicated, and the danger of Chagas' disease spreading to other parts of the tropics is pointed out ; for *Triatoma rubrofasciata* occurs in the tropical zone all round the world. There follows a key to the 9 genera of the family, with representative figures of most of these, and a complete list of the 70 known species giving their geographical distribution. Their vernacular names are given, and the ecological distribution of many is defined. Of these 70 species, 15 (belonging to 5 genera) are proved carriers of Chagas' disease—among this number is *T. rubrofasciata*. The geographical distribution of the disease is very incompletely worked out ; in this connexion the value of "xeno-diagnosis," as defined by Brumpt, for the recognition of obscure cases is emphasized.

In Venezuela 11 species belonging to 6 genera have been recorded, and 6 of these are known to be carriers of trypanosomiasis. Three of the latter, *Panstrongylus geniculatus*, *Eratyrus cuspidatus* and *Rhodnius pictipes*, were bred and studied in captivity, the technique of rearing and transporting to Europe being described. There has been much controversy as to the effects of the bites of Triatomidae. The author finds that single bites by the 3 species quoted had no effect at all on his skin ; though when a number of larvae were permitted to feed together in a restricted area there was very slight itching coming on in the evening for a few days after the experiments. [The reviewer has performed the same experiment with larvae of *Rhodnius prolixus* and developed numerous small papules causing almost unbearable itching, especially in the evenings, and persisting more than 3 weeks.] When larger quantities of saliva were injected intradermally a definite wheal was produced but burning and itching were absent. Further, the saliva appeared to have a local anaesthetic effect. Experiments indicate that heat and smell are the chief stimuli to induce biting, vision being unimportant. The paper also includes original data on the duration of the act of feeding, the amount of blood ingested, the resistance to starvation (this often exceeds 6 months), the behaviour during pairing, and the phenomena of cannibalism and coprophagy. There are also facts relating to the number of eggs laid and the duration of the egg stage. The variability in the latter figure recorded by Buxton (see this *Bulletin*, Vol. 28, p. 533) is shown to be due, in part at least, to the female retaining some of the eggs in the oviduct until considerable development has taken place, retention being caused presumably by the pressure of a recent meal. An extensive bibliography is given. Altogether the paper will form an admirable starting point for students of this subject. *V. B. Wigglesworth.*

BUXTON (P. A.). **The Relation of Adult** *Rhodnius prolixus* **(Reduviidae, Rhynchota) to Atmospheric Humidity.**—*Parasitology.* 1932. Oct. Vol. 24. No. 3. pp. 429–439. With 4 figs.

MELLANBY (Kenneth). **Effects of Temperature and Humidity on the Metabolism of the Fasting Bed-Bug** *Cimex lectularius,* **Hemiptera.** —*Ibid.* pp. 419–428. With 3 figs.

These two papers deal with substantially the same problem and may be considered together, the object of the authors being to discover the general principles which govern the physiological effect of different temperatures and humidities upon insects. In a previous publication Buxton has shown that the rate of evaporation of water from a number of insects is very nearly proportional to the saturation deficiency of the air. In the case of *Cimex lectularius,* Mellanby finds that in dry air the loss of water follows this law, but that in moist air (over 60 per cent. relative humidity) the rate of loss becomes relatively greater. It is suggested (though experimental evidence is wanting) that this may be due to the spiracles being kept closed most of the time in dry air, and open most of the time in moist. Protein is the chief reserve substance consumed during starvation. If the insect is starved in air with a relative humidity between 0 and 60 per cent., the proportion of dry matter in its body gradually rises. But at 90 per cent. this remains constant, and the time of survival is increased. This result reflects the ability of the bed-bug to get rid of its water or metabolism at high humidities by evaporation (*vide supra*) and is in conformity with the habit of this insect, which conceals itself in small spaces where the humidity of the air is high. In the case of *Rhodnius prolixus,* Buxton shows that when the insect is kept in air with a relative humidity of 60 per cent. or less, not only is more water lost by evaporation (as it is in Cimex) but less is produced by metabolism ; that is, the rate of metabolism falls off. Thus the proportion of dry matter in the body of the insect is increased in two ways, and it becomes impossible to test the law of saturation deficiency. The great resistance of Rhodnius to dry conditions may be illustrated by the fact that unfed male adults could be starved for 32 days at 23°C. over phosphorus pentoxide with only two deaths among eleven insects; and it is calculated that the insect will tolerate a change in concentration of the body solids from the normal 26 per cent. to about 40 per cent. of the total weight.

In both papers the conclusions are based on long series of experiments and in every case the significance of the results is proved statistically.

V. B. Wigglesworth.

MITSUHORI (Saburo). **A Study on the Destruction of a House-infesting Tick** (*Liponyssus Nagayoi*).—*Jl. Public Health Assoc. Japan.* 1932. Nov. Vol. 8. No. 11. pp. 1–4.

The mite (*Liponyssus nagoyoi*) infesting *Rattus rattus* (and, rarely, *R. norvegicus*) has become increasingly prevalent in the town of Nagoya during recent years. It attacks man, causing severe itching, and has been shown by YAMADA to be capable of transmitting plague. The resistance of these mites to various insecticides has been studied and the results tabulated ; but no conclusions of special interest are reached. There is some doubt whether *L. nagoyoi,* Yamada is not a synonym of *L. bacoti,* Hirst. *V. B. Wigglesworth.*

DUNN (Lawrence H.). **Notes on the Tick,** *Ornithodorus talaje* **(Guer.), infesting a House in the Canal Zone.**—Reprinted from *Psyche.* 1932. Vol. 38. No. 4. pp. 170–173.

This appears to be the first time that *Ornithodorus talaje* has been recorded as attacking man in Panama. The presence of the ticks was associated with an abundance of rats, and when these were eliminated the ticks disappeared. The bite produced a severe local reaction in one of the inmates of the house, but only a very slight reaction in the author. *V. B. Wigglesworth.*

BOYÉ (R.). La Papillonite Guyanaise. [**Urticaria caused by a Moth in Guiana.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1099–1106.

A saturniid moth belonging to the genus *Hylesia* was shown by LEGER and MOUZELS in 1918 to be responsible for a pruriginous dermatitis in Cayenne. Boyé now confirms and extends their observations. The affection is caused by barbed hairs connected with poison glands distributed over the abdomen of the moth, and the dermatitis may be set up, not only by handling the insects but from contact with these hairs, which are scattered over the furniture of houses when the insect flutters round the lights. The histology of the poison glands and the life history of the moth are described. There are four broods in the year, but the numbers of the insects vary greatly from time to time. During a heavy flight the chief measure of protection is to extinguish all lights in the houses. The larva also has urticating properties, but these have not been closely studied. *V. B. Wigglesworth.*

HINMAN (E. Harold) & FAUST (Ernest Carroll). **The Ingestion of the Larvae of** *Tenebrio molitor* **L. (Meal Worm) by Man.**—*Jl. Parasitology.* 1932. Dec. Vol. 19. No. 2. pp. 119–120. [13 refs.]

Very few records of human ingestion of mealworms exist in the literature ; these are quoted in this paper, and two new cases reported. In one of these a mature larva was vomited, and in the other a young larva was recovered in a tonsil at tonsillectomy. The fact that mealworms occur so frequently in human foods and that rodents are commonly associated with cereals suggests that they are probably responsible for most cases of human infestation by the rat tapeworm, *Hymenolepis diminuta.* *V. B. Wigglesworth.*

MACGREGOR (Malcolm E.). Certain Pathological Effects of Ultra-Violet Radiation on Mosquito Larvae and Pupae.—*Proc. Roy Soc.* Ser B 1932. Nov. 1. Vol 112. No. B 774. pp. 27–38. With 1 plate.

TRUE (Gordon Haines), Jr. Studies of the Anatomy of the Pajaroello Tick, *Ornithodorus coriaceus* Koch. I. The Alimentary Canal.—*Univ. California Public. Entom.* 1932. Vol 6. No. 3. pp. 21–48. With 3 plates & 17 figs. [13 refs.]

WIGGLESWORTH (V. B.). The Effect of Salts on the Anal Gills of the Mosquito Larva.—Reprinted from *Jl. Experim. Biol.* 1933. Jan Vol. 10. No. 1. pp. 1–15. With 7 figs. [14 refs.]

KALA AZAR.

Adler (S.) & Theodor (O.). **Vectors of Mediterranean Kala Azar.** [Correspondence.]—*Nature.* 1932. Oct. 1. Vol. 130. No. 3283. p. 507.

The authors have previously shown that a large percentage of both *Phlebotomus perniciosus* and *P. major* become infected with leishmania after feeding on Chinese hamsters infected with *Leishmania infantum.* In the case of *P. perniciosus* it was also shown that if the infection extends forwards to the epipharynx flagellates will escape from the proboscis during feeding. It was further shown that visceral leishmaniasis in susceptible animals (*Cricetulus griseus* and *Citillus citillus*) resulted on inoculation into the skin of flagellates from *P. perniciosus.* For these and other reasons it was concluded that this sandfly was a vector of kala azar in the Mediterranean area. This sandfly cannot, however, account for the whole of the kala azar of this area, for in Greece in the neighbourhood of Argos, a heavy centre of infantile kala azar, and in Athens, where both the infantile and canine diseases occur, it was not found. On the other hand *P. major* was common. This sandfly, owing to its purely nocturnal activity, had been previously overlooked in Greece. *P. major* is rare in Malta but is common in a limited area near Catania in Sicily. In order therefore to make a comparison between *P. perniciosus* and *P. major* a naturally infected dog was taken from Malta to Catania, where both sandflies were fed on the animal. Of 31 *P. major* 25 became infected while of 119 *P. perniciosus* only 33 became infected. It thus appears that *P. major* is a better carrier of Mediterranean kala azar than *P. perniciosus.*

C. M. Wenyon.

Anderson (Charles). Nouvelle contribution à l'étude du problème du kala azar. Culture du virus en lait de chèvre. **[The K. A. Problem. Culture of Leishmania in Goat's Milk.]**—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 294–297.

Of 53 cases of splenomegaly submitted to spleen puncture for the diagnosis of infantile kala azar 19 were positive and 34 negative. Of the positive cases it was found that goat's milk had formed a large part of the diet of 16 while of the negative cases it had only figured in the diet of possibly two. The apparent association of leishmania in the spleen with goat's milk led to the testing of this milk as a culture medium for the parasite. Milk was sterilized by exposing it to a temperature of 70°C. for 30 minutes on three occasions. Tubes of this undiluted milk were prepared, as also tubes of milk rendered alkaline with a solution of sodium carbonate. Furthermore milk was added in equal quantity to the water of condensation in tubes of N.N.N. medium. In all these media flagellates grew remarkably well, and in the pure milk showed a survival at 22°–24°C. of 4 months. It was also possible by inoculating a tube of the pure milk with bone marrow from an infected dog to obtain a culture of flagellates. Experiments are in progress to test the susceptibility of goats to kala azar and the possibility of their playing a part in the spread of the disease. *C. M. W.*

Franco (Enrico-Emilio). Les leishmanioses en Sardaigne. [**Leishmaniasis in Sardinia.**]—*Rev. Méd. et Hyg. Trop.* 1932. Sept.-Oct. Vol. 24. No. 5. pp. 217–242. With 1 fig. & 1 map. [2 pages of refs.]

The paper gives a general account of kala azar and oriental sore as observed in Sardinia up to the end of 1931. Twenty-four cases of kala azar have been described, six cases of oriental sore and one case of mucosal infection in which the only lesion was an ulcer on the left lower turbinal of the nose. Canine kala azar was first noticed in the island in 1917 by Sotgia but more recently Pegreffi has been studying 12 cases. *C. M. W.*

Phinos (Vassilios G.). Beitrag zur Diagnose der allgemeinen Leishmaniose (" Ponos," " Kala-Azar "). [**Diagnosis of K.A.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Nov. Vol. 36. No. 11. pp. 594–598. [15 refs.]

As early diagnosis is of the utmost importance in the treatment of kala azar the author has reviewed the various methods of diagnosis. Apart from the actual finding of parasites by one of the recognized methods, of which spleen puncture, not always free from danger, is the most certain, he appears to place the greatest reliance on the antimony test. For this he employs a 4 per cent. solution of neostibosan. Of 78 known cases of kala azar 71 gave a positive reaction while of 67 cured cases only one was positive. Of 309 controls only 13 were positive. It was positive also in the case of six children showing signs suggestive of kala azar who were brought to the clinic but did not return for spleen puncture. *C. M. W.*

Ruiz (Pedro Maximo). Un caso de kala-azar infantil diagnosticado parasitológicamente en sangre periférica. [**Cases of K.A. in Spain.**]—*Medicina Países Cálidos.* Madrid. 1932. Nov. Vol. 5. No. 6. pp. 486–506. With 5 figs. & 4 charts.

Cortés (Antonio Pedrajas). Informacion sobre un caso de kala azar infantil.—*Ibid.* pp. 510–511.

The first paper describes in great detail a case of kala azar in a child twenty months old from Cadiz. Diagnosis was made in the first place by the discovery of leishmania in a thick blood film of the peripheral blood. A cure was effected with neostibosan. The second paper records the first case of infantile kala azar from Maracena (? Granada). *C. M. W.*

Guasch (J.) & Llaurado (A). Un caso de infección asociada de kala-azar y paludismo en una enferma de dieciocho años. Un caso de kala azar en un enfermo de treinta años. [**Case of K.A. Associated with Malaria.**]—*Medicina Países Cálidos.* Madrid. 1932. Sept. Vol. 5. No. 5. pp. 424–428.

The two cases of kala azar, both in adults, were seen by the authors in Barcelona. The first was in a woman 18 years of age. In spite of treatment with neostibosan the temperature remained elevated. Repeated examinations failed to reveal any cause for this till after two months when the parasites of quartan malaria were discovered in the blood. Quinine treatment followed by treparsol brought about a rapid response and uninterrupted recovery. A spleen puncture performed two days after the discovery of malarial parasites showed that the leishmania present two months before had quite disappeared. The second case was in a man 30 years of age. After diagnosis by spleen puncture had been made the patient left the country.

C. M. W.

CHATTERJEE (Krishnadhan). **Jaundice in Kala-Azar. (Van Den Bergh Reaction in Kala-Azar.)**—*Calcutta Med. Jl.* 1932. Nov. Vol. 27. No. 5. pp. 133–144. [11 refs.]

The author discusses the part played by the reticulo-endothelial system in blood formation and destruction and in the production of bile pigments. As the reticulo-endothelial system is blocked with parasites in kala azar there will be diminished blood formation and consequent anaemia, diminished bile pigment formation and little tendency to jaundice and diminished defence and immunity reaction rendering more serious the onset of such complications as cancrum oris and pneumonia. Naturally there cannot be excessive blood destruction in kala azar so that, contrary to the claims of GUHA (this *Bulletin*, Vol. 29, p. 870), the type of haemolytic jaundice giving a direct delayed van den Bergh reaction seen in malaria, pernicious anaemia, Bengal splenomegaly, ankylostomiasis, acholuric jaundice and other diseases is not met with. *C. M. W.*

PHINOS (Vassiliou). Die Behandlung von Kala-azar mit Neostibosan unter besonderer Berücksichtigung der Diagnosestellung mittels der Serumreaktion. [**Treatment of K.A. with Neostibosan.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932 Oct. Vol. 36. No 10. pp. 515–521.

An account is given of the treatment of 10 cases of kala azar in children from 1 to 12 years of age by intramuscular injections of neostibosan. As a rule an injection was given each day, a total of 8 to 10 in each case. The total quantity given varied with the weight from 0·38 to 3·0 gm. Of the 10 patients 5 recovered while 4 died and one was taken away without having shown any improvement after having had 0·65 gm. in eight injections. One died of noma, one of pneumonia and one of tuberculosis. It is concluded that the treatment is to be recommended because of the ease of administration, the cures it brings about and the shortness of the course, which makes it inexpensive.

C. M. W.

ZAHRA-NEUMANN (Charles). **A Report on the Treatment of Infantile Kala-azar.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. pp. 383–388.

Between the end of March 1923 and the beginning of May 1932 there were treated in Malta 315 cases of infantile kala azar. The first 100 cases treated with tartar emetic gave a mortality rate of 26·5. That this was unnecessarily high is shown by the fact that with further experience the mortality rate with this drug in the next 124 cases was 17·7. Better results were subsequently obtained with neostibosan in 68 cases with a mortality of 10·17 per cent. One case, which appeared to resist tartar emetic treatment, responded to neostibosan while two cases resisting neostibosan were cured by tartar emetic. Certain cases failed to respond to either drug. It is noted that the quantity of neostibosan required to effect a cure contains three times as much antimony as the amount of tartar emetic so required. *C. M. W.*

LIGNOS (A.). Note sur le traitement du kala-azar infantile. [**Treatment of Infantile K.A.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1043–1044.

The author points out that during the 3 winters (November to April) of 1929 to 1932 there were diagnosed in the Isle of Hydra 35 cases of infantile kala azar. All but one of these children were treated by intramuscular or subcutaneous injections of stibenyl and were cured except two, one insufficiently treated while the other died of pneumonia. The dose at each injection as a rule varied from 6 centigrams to 12 centigrams as the age varied from 6 months to two years. Each child received 30 injections, one every third day. Though occasionally the above dosage was exceeded no unpleasant results were noted. At the present time all the children are alive and well. *C. M. W.*

BRAHMACHARI (Upendranath), MAJUMDER (Akhil Ranjan) & DE (Rash Behari). **The Intensive Antimonial Treatment of Kala-Azar—Urea Stibamine. Part II.**—*Jl. Trop. Med. & Hyg.* 1933. Jan. 2. Vol. 36. No. 1. pp. 1–5.

The authors give details of the cure of 31 cases of kala azar by daily injections of urea stibamine. The number of injections varied from 4 to 16 and the total amount of drug from 0·2 to 2·5 gm. It is noted that with daily injections in 26 of the 31 cases 1·5 gm. or less of the drug was sufficient to bring about a cure, which is significantly less than the quantity which would be required by less intensive forms of treatment. [Though the cases are referred to as cured, the after history of a number of them does not extend beyond one month.] *C. M. W.*

BRAHMACHARI (Upendranath). **Studies in Kala-Azar and Chemotherapy of Antimony. Part VI. Treatment of Kala-Azar with Intramuscular Injection of Sodium Sulphomethyl Stibanilate.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. pp. 389–396. With 14 charts.

The paper describes the successful use of sodium sulphomethyl stibanilate in the treatment of 15 cases of kala azar by intramuscular injection. It has been used up to a dose of 0·5 gm. without producing local or constitutional disturbance. *C. M. W.*

MICHELETTI (Ettore). Sul reperto di leishmanie libere nel sangue periferico. [**Free Leishmania in the Peripheral Blood.**]—*Ann. di Med. Nav. e Colon.* 1932. Sept.-Oct. 38th Year. Vol. 2. No. 3–4. pp. 564–570. With 5 figs. on 1 double plate. [16 refs.]

After reviewing the records of the discovery of leishmania in the peripheral blood of cases of kala azar the author gives an account of his own findings in the case of a child 9 years of age. He discovered parasites in films of the peripheral blood but always extracellular. He puts aside the possibility that this position is the result of damage to cells in film making, for the parasites, singly or in groups, were not near leucocytes. This leads him to various speculations regarding the habitat and virulence of the parasites, all of which break down if it is thought possible that the parasites he observed had actually escaped from a large mononuclear cell which had been completely destroyed as often happens in making the films. *C. M. W.*

RAY (J. C.). **Cultivation of Various Leishmania Parasites on Solid Medium.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 355–367. With 4 figs.

The author, who has studied the cultivation of leishmania in solid media during several years, has arrived at a technique which gives abundant growth of the organisms. The medium employed is a special form of agar to which as usual one-fifth of its volume of defibrinated rabbit blood is added. Directions are given for using this medium in Petri dishes, according to the technique of NÖLLER, or in ordinary test tubes on the sides of which small basins to hold the medium have been blown. Those who wish to repeat this work must consult the article for details of technique. *C. M. W.*

DA FONSECA (Flavio). **On Specific Agglutination with Noguchi's Technic as a Method of Distinction of Flagellates of the Genus** *Leishmania* **Ross, 1903.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 453–457.

——. **Differentiation of Flagellates of the Genus** *Leishmania* **Ross, 1903, by the Lytic Action of Specific Sera.**—*Ibid.* 1933. Jan. Vol. 13. No. 1. pp. 113–126. [55 refs.]

In these two papers the author describes experiments he undertook to differentiate various leishmania from one another and from leptomonas of the flea by the use of the sera from rabbits which had been subjected to inoculations with the flagellates. The medium employed in the first series of experiments, described in the first paper, was Noguchi's leptospira medium in which the normal rabbit serum was replaced by immune rabbit sera, a large number of which had been prepared. The tubes after inoculation with the flagellates were left at room temperature and examined from time to time for evidence of agglutination. It was found that anti-*Leishmania brasiliensis* serum agglutinated all the 13 strains of *L. brasiliensis* which had not been lysed by the serum but none of the strains of *L. tropica*, *L. donovani*, *L. canis* or *Leptomonas ctenocephali*. In the second paper experiments to test the lytic action of the immune rabbit sera are described. In this case haemoglobin was added to the medium and the cultures were left for 10 days at a temperature of about 25°C. At the end of this time flagellates were only present in those tubes in which the sera were heterologous. All the strains of *L. brasiliensis* were lysed by *L. brasiliensis* sera but none of the other flagellates tested. The results indicate a close relationship between the 13 strains of *L. brasiliensis* isolated in Brazil and the Argentine and their difference from the other species investigated. *C. M. W.*

FALCHETTI (E.) & BRAC (G. Faure). La leishmaniose canine à Nice. Etude épidémiologique. [**Canine Leishmaniasis at Nice.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1091–1099. [10 refs.]

During a period of 9 months the authors have examined for kala azar 188 stray dogs at the pound at Nice. The dogs were divided into two groups—those showing signs suggestive of kala azar and those showing none. In the first group there were 42 [? 43] dogs, of which 18 were found to be infected at post mortem examination. Of the second group of 145 dogs 19 were infected, showing that even when dogs appear healthy they may be suffering from kala azar. The authors also examined 19 other dogs still under the care of their owners and showing symptoms suggestive of the disease. Of these 15 were positive. The various procedures for diagnosis were tested. This included examination for parasites in scrapings from ulcers and in material from liver and bone-marrow puncture; culture of the puncture material; serological reactions such as the formol gel test, the antimony test or deviation of the complement. In 3 cases it is stated that parasites were only present in the ulcers but their absence from the internal organs was not determined by culture methods but merely by smear examinations. It is evident that no clinical sign is pathognomonic of kala azar in dogs and that no single test or examination will give a definite diagnosis. *C. M. W.*

GIRAUD (P.) & CABASSU (H.). La leishmaniose canine dans la région de Marseille. [**Canine Leishmaniasis in Marseilles District.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1040–1043.

During the study of 39 cases of canine kala azar seen in 3 months in the district of Marseilles the authors have noted three types of lesion which on scraping or incision will often yield leishmania. The first takes the form of ulcers on the inner surface of the lips, the second of ulcers about the eyes or ears and the third plaques of dermatitis on the face or back. Examination of these lesions is much simpler than puncture of the organs or bones and will often give a positive diagnosis. The formol-gel reaction is positive in advanced cases but is of little help at the commencement of the disease. *C. M. W.*

FALCHETTI (E.). Observations sur la localisation cutanée des *Leishmania* chez les chiens dans le midi de la France. [**Cutaneous Localization of Leishmania in Dogs in S. France.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1036–1039. With 2 figs.

The author during a study of canine kala azar in the South of France, particularly in Nice and Marseilles, has been able to confirm the observations of ADLER and THEODOR made in Malta that the parasites are distributed throughout the body in the skin where they are lodged in the histiocytes and even in fibroblasts. These infected cells occur not only round the hair follicles and sebaceous glands but also in the intervening areas. The follicles and glands are more heavily infected in areas of skin showing eczema. When actual ulceration occurs parasites are rare in the ulcerating area but increase in numbers as the more healthy skin is reached. As noted by ADLER and THEODOR there is no relation between the number of cutaneous parasites and those in the internal organs. This is so marked that the author is inclined to the view that the primary site of infection is the skin and that it is here that the parasite finds conditions favourable to reproduction. *C. M. W.*

BALOZET (L.). Les prélèvements pour la recherche des leishmanies ; technique de la ponction de la rate chez le chien. [**Technique of Skin Puncture and Allied Diagnostic Procedures in the Dog.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 341–346. With 1 fig.

In this article the author gives directions for the operations of bone puncture, liver puncture and spleen puncture for the diagnosis of kala azar in dogs. For the first of these the tibia is chosen and under local anaesthesia a small hole is made with a drill in the upper third of the tibia through its antero-internal surface. Through the hole bone marrow is aspirated with a syringe. Puncture of the liver is readily accomplished by passing the needle of the syringe in the tenth right intercostal space at a point one to two finger-breadths from the spinous processes of the vertebrae. In large animals the needle must be at least 6 cm. in length. Spleen puncture is more difficult to perform and is regarded by some as impossible. The author, however, has evolved a technique which has simplified the operation. With the animal in the recumbent position with its back uppermost the spleen lies just posterior to the left costal margin. An imaginary line drawn horizontally so as to divide the thorax into equal upper and lower parts when looked at from the side will cross the costal margin at a point on a level with the middle of the spleen. Puncture just posterior to this point will find the organ. It is evident that experience is required for this operation and readers are referred to the original article for further details and directions. *C. M. W.*

COUSSA (Maurice). Contribution à l'étude et au traitement du bouton d'Alep. [**Study of Aleppo Sore.**]—*Gaz. hebd. Sci. Méd. de Bordeaux.* 1932. Sept. 25. Vol. 53. No. 39. pp. 615–624.

The author, who has had a large experience of oriental sore in Aleppo, having in two years dealt with 980 cases exhibiting 2,774 sores, analyses these cases from the points of view of distribution of sores on the body, seasonal incidence, susceptibility in relation to age, sex and nationality, and character, number and duration of the sores. As regards treatment the author advocates the use of the cryocautery especially where a single sore is present. When multiple sores occur antimony treatment is indicated, the drug favoured being fouadin, on account of the possibility of administering it subcutaneously.

C. M. W.

MAZZA (Salvador). Nuevas observaciones sobre tratamiento de la leishmaniosis americana por la fuadina. [**Treatment of American Leishmaniasis by Fouadin.**]—*7a Reunión Soc. Argentina Patol. Regional del Norte, Tucumán, 5, 6 y 7 octubre, 1931.* 1a mitad. pp. 513–526. With 14 figs.

The author, who has already reported the good results he has secured in the treatment with fouadin of mucocutaneous leishmaniasis in the

Argentine (this *Bulletin*, Vol. 29, p. 117) now describes a series of 6 other cases. Three of these were in children aged 3, 5 and 11 years belonging to one family. It is of interest that they all contracted the disease simultaneously in a locality where the father and mother had previously suffered from the same condition. The fourth case was in a child 4 years of age and the fifth and sixth in adults of 35 and 18 years. Some of the patients had had previous treatment with drugs which had not influenced the infection. All were treated with intramuscular injections of fouadin in doses varying from 0·5 to 5·0 cc. The treatment was continued for varying periods, and in all cases, including the second with a mucosal lesion in the roof of the mouth, brought about a cure except in two, one of which, the child of 3, was on the way to recovery when death occurred from pneumonia. The other resistant case was the youth of 11 years of age. The lesion, which was a large one behind the ear, diminished considerably in extent but had not completely healed after 29 injections. Treatment was interrupted for two and a half months when not only did the original lesion show signs of renewed activity but a further one appeared on the outer surface of the forearm. Injections of fouadin were recommenced but did not have the desired effect. Accordingly treatment with intravenous injections of neostibosan was instituted. There was an immediate response and a rapid healing of both lesions. *C. M. W.*

SILVA (Flaviano). Vantagens e inconvenientes do tratamento da leishmaniose tegumentar pelo eparseno (amino-arsenophenol). [**Treatment of Dermal Leishmaniasis by Eparseno.**]—*Brasil-Medico.* 1932. Sept. 10. Vol. 46. No. 37. pp. 785–788. With 2 figs.

In muco-cutaneous leishmaniasis of S. America eparseno brings about a rapid cicatrization of the lesions, even in those which have proved to be resistant to tartar emetic and other treatments. Contrary to the claims of many authors, however, the drug is fairly toxic so that it is not possible to continue the treatment for any length of time. It is evident that this drug has not completely solved the problem of treatment of this disease. *C. M. W.*

DONATIEN (A.), LESTOQUARD (F.) & PARROT (L.). Leishmaniose et fusospirochétose associées chez le chien. [**Leishmaniasis and Fusospirochaetosis Associated in the Dog.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. June. Vol. 10. No. 2. p. 296. With 2 figs. on 1 plate.

The authors refer to two cases of cutaneous leishmaniasis described by DELAMARE and GATTI in which the sores had become secondarily infected with spirochaetes and fusiform bacilli. They record the history of a dog which was brought to the Pasteur Institute in Algiers suffering from kala azar with ulcerations about the nose, ears, paws and tail. The dog was kept under observation for a year during which time the ulcer on the nose assumed a crateriform character. Examination revealed few leishmania but numerous spirochaetes and fusiform bacilli which, it is concluded, had aggravated the lesion. *C. M. W.*

DI LOTTI (V. Kálalová). **An Experiment for Immunization against Cutaneous Leishmaniasis.**—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 545–550.

The author had the idea that immunity to oriental sore might be produced by grafting into the skin of a non-immune person a small portion of skin from one that had already had the disease. Accordingly in 12 cases the operation was performed, the piece of skin being removed from near the scar of a healed sore. Seven of the 12 cases were observed for 1 to 4 years. Though they all lived in districts of Baghdad where practically no one escapes, 4 remained free from infection. In the 3 that contracted the disease the grafted skin had been taken from persons who had recovered from 29 to 40 years before. In the other cases the scars were 1, 2, 5 and 6 years old respectively, so that the skin taken from persons in whom immunity was still developed, appeared to be capable of conferring immunity when grafted. *C. M. W.*

FRANCHINI (Giuseppe). Leishmaniosi nelle colonie italiane del Nord-Africa. [**Leishmaniasis in the Italian Colonies of N. Africa.**]—*Arch. Ital. Sci. Med. Colon.* 1932. Dec. 1. Vol. 13. No. 12. pp. 703–707. English summary (6 lines).

The author summarizes the records for human and canine kala azar and oriental sore from the Italian colonies of N. Africa. Up to the present very few cases have been noted. *C. M. W.*

MARCIALIS (Italo). Contributo alla conoscenza della leishmaniosi infantile in Sardegna. [**Infantile K.A. in Sardinia.**]—*Pediatria.* 1932. Dec. 1. Vol. 40. No. 23. pp. 1292–1299. [25 refs.]

Record of a case of kala azar in a child six years of age in Sardinia.

C. M. W.

LENFELD (J.). Contribution au diagnostic clinique de la leishmaniose canine spontanée. [**Clinical Diagnosis of Canine K.A.**]—*Rev. Gén. de Méd. Vét.* 1933. Jan. 15. Vol. 42. No. 493. pp. 1–11.

This paper is the French version of the first of three noted in this *Bulletin,* Vol. 28, p. 647. It is there pointed out that an examination of the smears and sections from the dog " Hongkong " by the reviewer himself, who had received them from the author, revealed no evidence of leishmania infection. *C. M. W.*

LAVILLAT (F.) & CATTOIR (E.). Un cas de bouton d'Orient dans le Tell constantinois. Traitement par le néostibosane. [**Oriental Sore in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. Sept. Vol. 10. No. 3. pp. 410–412.

PASCAL (J. M.) & BACHY (J.). Sur l'existence du bouton d'Orient au Mzab.—*Ibid.* pp. 413–415. With 3 figs. on 2 plates.

HORRENBERGER (R.). Existence du bouton d'Orient à Beni Ounif (Sud oranais).—*Ibid.* pp. 416–417.

The three papers record cases of oriental sore (one, three, and two cases respectively) from the localities in Algeria mentioned in the titles.

C. M. W.

SCHEWEBEL (A.) & FOURRIER (J.). Un cas autochtone de bouton d'orient dans la région de Bone.—*Arch. Inst. Pasteur d'Algérie.* 1932. Mar. Vol. 10. No. 1. p. 39.

REVIEWS AND NOTICES.

MATHESON (Robert) [Ph.D., Professor of Entomology, New York State College of Agriculture, Cornell University]. **Medical Entomology.**—pp. xiv+489. With frontispiece & 211 figs. 1932. London: Baillière, Tindall & Cox, 7-8 Henrietta Street, Covent Garden, W.C.2. [29s.]

Text books on Medical Entomology continue to arrive from the United States. The latest to appear is by R. Matheson, Ph.D., who is professor of entomology at the New York State College of Agriculture in Cornell University. This is a very well-balanced work which presents the established facts of medical entomology clearly and concisely. Indeed, the most striking feature of the book is the admirable sense of proportion displayed by the author in dealing with each side of his subject; anatomy, medical importance and control measures are clearly set forth. The work is generously illustrated and most of the figures are clear and well chosen; though it is to be doubted whether the line drawings of the various Muscid flies will really prove very helpful. Another good feature of the book is the way in which the reader's attention is directed continually to original publications, each chapter being followed by a considerable bibliography (in one of which the *Tropical Diseases Bulletin* is described as " the most valuable of publications "), while the first chapter gives an excellent historical account of medical entomology during the past fifty years.

From a general standpoint, American textbooks are apt to seem a trifle insular; and that under review is no exception. There is a key to the North American species of *Anopheles* and the breeding habits of these are discussed; but species from the rest of the world are mentioned only in lists, and no adequate impression is given of the diversity of conditions to be met with elsewhere. And this same fault appears also in the somewhat sketchy accounts of plague and sleeping sickness. *Aëdes variegatus* is included in a list of vectors of filariasis, but the significance of its diurnal habit in relation to filarial periodicity in the South Pacific is not mentioned. A number of keys to genera and species are included, and many of these will certainly prove useful; but it is difficult to see any value (except for purely instructional purposes) in incomplete keys such as that on page 40, which embraces just a few of the better known species of *Ornithodorus* selected more or less at random and unaccompanied by any warning to workers in the field not to use it. The book is well indexed and seems to be singularly free from minor errors—although the familiar figure on page 393 still bearing the legible signature of Terzi is credited to Sambon. The publishers' leaflet claims, among other things, that Professor Matheson's book " presents the cultural background." Perhaps this refers to many of the excellent features mentioned in this review; perhaps it refers to the fact that the book is prefaced by what can only be described as the world's worst couplet. *V. B. Wigglesworth.*

STANTON (A. T.) [C.M.G., M.D., F.R.C.P., Chief Medical Adviser to the Secretary of State for the Colonies; formerly Director of Government Laboratories, F.M.S.] & FLETCHER (William) [M.D., M.R.C.P., Member Colonial Advisory Medical Committee; formerly Director, Institute for Medical Research, F.M.S.]. **Melioidosis.** *Studies from the Institute for Medical Research, Federated Malay States, No. 21.*—pp. iv+59. With 3 charts & 37 figs. on 27 plates. 1932. London: John Bale, Sons & Danielsson, Ltd. [Review appears also in *Bulletin of Hygiene.*]

In this short monograph is collected the available information, much of which is due directly to the work of the authors themselves, on that interesting and rather puzzling disease, melioidosis. First described by

Colonel WHITMORE at Rangoon in 1912, the disease has since been recognized in the Federated Malay States, in Cochin-China, Tonking, and Ceylon. Of a total of 83 cases reported up to the present time all but three have occurred in males and all but two have proved fatal. Melioidosis appears to be a natural disease of rodents, especially rats, but its incidence in these animals is not known precisely. Infection of human beings is supposed to occur as a rule through consumption of food contaminated with infected animal excreta. The authors are of the opinion that the disease is far commoner than would appear from the number of reported cases; considering that only nine cases have been diagnosed during life, this seems highly probable. So little is yet known about its frequency, about the method of spread, and about the occurrence of non-fatal and possibly latent infections, that workers, especially in the tropics, should be actively on the look-out for this disease. The present volume with its brief, clear description of the clinical and pathological manifestations both in man and animals, its account of the causative organism, and its discussion on diagnostic procedure, should assist in this enquiry, and should be read by all tropical workers who are not already acquainted with the original papers of the authors. *G. S. Wilson.*

SCHNITZER (R.). **Die spezifische Arzneifestigkeit der pathogenen Mikroorganismen.** [The Specific Drug Resistance of the Pathogenic Microorganisms.] Reprinted from *Ergebnisse d. Hyg. Bakt. Immunitätsforschung u. Experim. Therap.*, 1932. Vol. 13. pp. 227–326. With 1 text fig. [5 pages of refs.]

It is now just over 25 years since EHRLICH founded the subject of chemotherapy. Almost at the beginning of his work EHRLICH (and his co-workers BROWNING, FRANKE and ROEHL) discovered the important fact that trypanosomal infections in mice were capable of gradually developing a resistance to parafuchsin; and shortly afterwards it was ascertained that these infections could likewise be made resistant to aromatic arsenicals, such as atoxyl, and to the acridine dyes. The practical significance of this discovery for the treatment of trypanosomal infections of man and stock was at once realized by EHRLICH, and probably since that time no aspect of the subject of chemotherapy has attracted more attention than has drug-resistance. Whilst much experimental work has been done, and many more or less unsatisfactory clinical observations have been made, there is no doubt that theory has far outstripped facts, and the whole subject has become chaotic. The literature dealing with drug-resistance of micro-organisms is now enormous: and nobody who troubles himself to wade through it can fail to be impressed with the many contradictory statements which it contains, with the many unwarrantable deductions which have been made solely on the basis of analogy, and finally with the gigantic superstructure of hypothesis which has been erected on the shifting sands of questionable experimental facts.

In the present article, consisting of about 100 pages, Schnitzer has presented a masterly summary of the investigations which have hitherto been made on the subject of drug-resistance. Such an article could only have been written by one who has devoted himself many years to experimental research on the subject, and there can be no doubt it is an excellent piece of work, which will prove invaluable to all who, in the future, may enter this fascinating, but very difficult, field of work.

It is with trypanosomal infections that by far the greatest amount of work on drug-resistance has been done, and consequently the bulk of the present article is concerned with these infections. Nevertheless, the author deals fully with what has been done on the other protozoal infections (malaria, amoebiasis), on the spirochaetal infections, and on the various bacterial infections. It would be very advantageous if those clinicians who write and talk so glibly about quinine resistant malarial parasites, emetine resistant amoebae, salvarsan and mercury resistant spirochaetes, and so forth, would refer to this article so that they might discover how little is really known on these matters. Such a piece of research might cause them to pause and ask themselves how far actual observation is responsible for the faith that is within them, and whether they have not, in large measure, been carried away by a natural, but very dangerous tendency, to draw analogies from what they know, or believe they know, happens in trypanosomal infections. It seems to the reviewer that such reflections might even assist the clinician to conceive it possible that there may be some other explanation of his failure to cure than that the parasite (trypanosome, malaria, amoeba or spirochaete) with which his patient is infected has become drug-fast. *W. Yorke.*

LOGIE (H. B.) [M.D., C.M. Executive Secretary] [Edited by]. **A Standard Classified Nomenclature of Disease. Compiled by the National Conference on Nomenclature of Disease.**—pp. xvii+702. 1933. New York: The Commonwealth Fund. [£1 1s. 0d.]

There has not hitherto existed in America any generally recognized standard nomenclature of disease such as is supplied in this country by the official Nomenclature of Diseases drawn up by the Royal College of Physicians. The present book is an attempt to provide such a standard. It has been compiled under the auspices of a National Conference on Nomenclature of Disease on which all the leading American Medical Organisations (including the American Society of Tropical Medicine) were represented. It is designed, in the words of the Preface, "to include every disease which can be recognised clinically, to avoid repetition and overlapping, and to classify the diseases in a logical manner." The system of classification is both topographical and etiological, each disease or injury being described and classified in terms of the tissue or organ where it is principally manifested as well as in etiological terms. It is thus much more ambitious than the official nomenclature of this country which provides only a list of approved names of diseases arranged under systems and organs. Whether the time is yet ripe for any complete classification of diseases on an etiological basis is a matter of opinion, and it may be objected that any attempt at such is bound to give the appearance of more accurate knowledge than we in fact possess. There can be no question, however, about the care and thought which have been bestowed on this particular classification and it will doubtless be found useful in America and elsewhere pending the issue of what is the ideal—an *international* Nomenclature on the lines of the "International List of the Causes of Death." In this country, however, and throughout the British Empire, the Nomenclature of Diseases must continue to form the basis of all official records for the present.

It should be added that, in addition to a classified list of diseases, the American Standard Nomenclature provides a system of code numbers affixed to the name of each disease which are designed to facilitate filing in hospitals and institutions as well as the collection of the elaborate tables and statistics which are so familiar in American medical literature. They seem well and ingeniously adapted to these purposes.

Robert Hutchison.

ROCKEFELLER FOUNDATION. **Annual Report 1931** [MASON (Max), President].—pp. viii+420. With numerous illustrations. New York: 61 Broadway.

This volume contains, besides the reports of the Secretary and Treasurer which are mainly financial, reports of the work of the International Health Division, of that in the Medical Sciences, that in the Natural Sciences, in the Social Sciences, and in the Humanities. Since readers of this *Bulletin* are chiefly interested in the work of the International Health Division we shall not refer again to the other sections.

In a brief review of the Public Health Program it is stated—Two general purposes have underlain the many forms of public health work in which the Foundation has participated: the acquirement of new knowledge in hygiene and public health by field and laboratory research; and the extension of such knowledge through application of what is already known. The Foundation undertakes such activities as would be pioneering in spirit, sound in principle and practical in purpose.

During 1931 the Foundation assisted the governments of 47 countries in carrying on public health work, continued contributions to the Health Organization of the League of Nations, and engaged in activities in connexion with tuberculosis, respiratory diseases, undulant fever and anaemia. It engaged in intensive field research on hookworm disease, malaria, and yellow fever. There follows an account of the work of the Foundation researchers on the last three. Yellow fever is studied at the Foundation laboratories in Nigeria, Bahia and New York. The papers briefly summarized were noticed in this *Bulletin* at the time of their publication.

Under Public Health Nursing and Nursing Education we learn that 1931 witnessed the conclusion of a ten-year period of co-operation between the Foundation and the Government of Brazil in the development of modern nursing, especially public health nursing and nurses' education. A training school was organized and Brazil now has a Bureau of Nursing which is part of the National Department of Health. In the D. Anna Nery School of Nursing the bureau has a first-class training centre with facilities for 100 students and a course of three years duration. The school has graduated 114 Brazilian nurses of whom 98 have remained in active nursing work. Similar activities were in being in other countries. In 1931 the Foundation assisted the governments of 33 foreign countries to develop and strengthen certain essential services, such as sanitary engineering, public health laboratory services, epidemiological divisions, bureaux of vital statistics. In sanitary engineering, for instance, help was given in Central America, Greece, China, Mysore, Egypt; in public health laboratories in Dublin, Nicaragua, Bogota, Sofia, China.

Under Public Health Education, Training Centres, we learn that funds were voted to assist the Government of Nigeria for a 3-year period in a program of public health development, which includes the establishment of centres for the training of African midwives, public health nurses and sanitary inspectors. In 1931, 226 health officials and health workers were enabled to visit countries other than their own. In the last ten years more than a thousand selected young men who had already completed their medical work were given opportunity to specialize in public health: these men go back to their own countries assuming key positions in the public health service.

Such are some of the enterprises of the International Health Division, valuable at any time but especially so in these days of financial stress when funds are almost everywhere lacking for fresh development. The report is attractively got up with many photographs. including one of Wickliffe Rose who died in the year under review and whose efforts in the campaign for eradication of hookworm disease in many parts of the British Empire from 1913 onwards will be gratefully remembered. *A. G. B.*

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BACTERIOPHAGE WITH SPECIAL REFERENCE TO PLAGUE AND CHOLERA.

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(Received February 22, 1933.)

The bacteriophage question is one of comparatively recent date. It may be said to have been definitely promulgated by TWORT (1915) in his " Investigations on the Nature of Ultramicroscopic Viruses," with his discovery and discussion of the glassy or watery colonies of staphylococci which appeared on nutrient agar plates sown with glycerinated calf vaccinia. The protagonist of the bacteriophage theory is, however, undoubtedly D'HERELLE, who has been its ablest exponent and the focus of attack for some sixteen years. The theory of the " bacteriophage," that is of a minute, ultramicroscopic, living organism, parasitic upon and lytic towards bacteria, was given out in 1917. It has undergone surprisingly little change since that date, in spite of the fact that it has been fundamentally opposed. As in all arresting discoveries there are to be found indications of conscious or unconscious appreciation of this phenomenon by previous workers. HANKIN (1896) drew attention to the bactericidal action of the water of the Ganges and of the Jumna for the cholera organism and, according to D'HERELLE, he was probably face to face with the phenomenon of bacteriophagy. GILDEMEISTER (1917) observed and remarked upon peculiarities of texture and architecture in colonies of intestinal organisms. He figured nibbled, defective colonies of dysentery and coli (Flatterformen), which are undoubtedly exhibitions of the bacteriophage phenomenon in the specially sensitive typho-coli group. As, in this controversy regarding bacteriophagy, D'HERELLE practically holds the stage from the commencement with abundance of clear, forceful exposition, it may be well in a review such as this to make his work the main source of reference in discussion. Two of his works are: " The Bacteriophage," (1922) and " The Bacteriophage and its Clinical Applications," (1930). Of these two, the latter has been mainly used as authority for the statements made in this survey. Although this review has special reference to cholera and plague, it is apparent that the subject requires for its adequate presentation and understanding a much wider basis than is afforded by these two diseases. In consideration of the fact, however, that most of the evidence points to the close association of bacteriophage with organisms of the gastro-intestinal tract, it is simple and justifiable for the reader to make substitution of the intestinal organism *V. cholerae* for such organisms as *Bact. coli*, *Bact. typhosum*, *Bact. dysenteriae*, etc., when these latter are used for illustration of the properties of the bacteriophage. As the organism of plague, *Past. pestis*, is not an intestinal organism it is placed in a somewhat different, but none the less interesting, category from the cholera organism. D'HERELLE evidently regards this organism as having little in common with either the enteric or pyogenic groups of bacteria.

Nature of the Bacteriophage or Lytic Principle.

The controversy over the nature of the bacteriophage is by no means settled. In fact it is essentially a controversy over the nature of life. There is perhaps little likelihood of a revival of the disputation upon the possibilities of spontaneous generation of living from non-living matter, the archebiosis and heterogenesis of BASTIAN (1874). That was regarded as having been settled by PASTEUR'S (1862) experiments on the vital theory of fermentation, which established the doctrine, *omne vivum ex vivo.* "The progress of science,"says PASTEUR, "shows more and more that the study of actions brought about under the influence of vegetable or animal life however complicated leads back ultimately to the discovery of phenomena which belong to the cell." Had the demonstration, however, of the existence of ultramicroscopic viruses and especially of an ultravirus such as the bacteriophage, having dimensions (20–30 μμ*) of the same order as those of a molecule of serum-globulin (d'HERELLE, 1925a) or very close to that of a particle of collargol (PRAUSNITZ, 1922) been made earlier, we may wonder whether this controversy would have died down as completely as it has done. The size of bacteriophage has been determined by testing the limits of filtration through graded collodion membranes. The recent studies of ELFORD and ANDREWES (1932) show that phages are composed of particles "whose size is uniform for any one phage" though varying from phage to phage. The estimated diameter of the smallest phage was 8–12 μμ and that of the largest probably between 50 and 75 μμ. The phage, according to D'HERELLE, "in view of its size . . . can only be formed of a simple protoplasmic micella. This, in itself, suffices to demonstrate that the cellular theory of life is false , that the cell is not the unit of life." This again is a blow at the equally famous doctrine of VIRCHOW (1858) that "a cell can only develop where a cell has preceded it," a doctrine which was first promulgated by GOODSIR (TURNER, 1868, p. 92) in 1845 (MCKENDRICK, 1888, p. 203) and has been expressed in the phrase *omnis cellula e cellula.* A micella, it may be explained, is the term used for an aggregate of molecules, ions, or both, in a colloidal solution. The ultramicroscopic virus according to TWORT may well belong to a "field of life more lowly organised than the bacterium or amoeba" (*loc. cit.*) or may be, in D'HERELLE'S phraseology, a protobacterium. DALE (1932) speaks of the ultramicroscopic viruses as "almost on the border line between unorganized toxic principles and organized living beings." GYE and LEDINGHAM (1930) make the remark with regard to theories denying the living character of viruses :—" The suggestion put forward by SANFELICE in 1914 that a virus is a non-living poison elaborated by affected cells and possessing the power to affect new cells, provoking in them the formation of a further quantity of the poison, forms the basis of most rival theories."

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* 1 μμ, or millimicron, = 1–1000th μ, or 1–1,000,000 mm.

What we have so briefly said will suffice to indicate something of the nature of the implications which are bound up in bacteriophage theory, or, in a wider sense, with the subject of the ultramicroscopic viruses generally. According to D'HERELLE (1927) two main hypotheses exist :—as to its physical nature, whether it be in solution or in suspension, and as to its biological nature whether " it is derived from the bacterium itself and in that case is an enzyme, or it is independent of the bacterium and so can only be a living autonomous being which utilizes bacterial substance in order to reproduce. No other hypothesis is logically possible." We may decide at the outset to adhere, purely as a working hypothesis, to the first of the two alternatives enunciated by D'HERELLE.

Bacteriophage is particulate in character, as seems to be apparent from the way in which the phenomenon of bacteriophagy can be made to distribute itself in the shape of areas of clearance of growth or " colonies," quantitatively and discretely over the surface of an agar plate sown with a susceptible bacterium. By its transmissibility in indefinitely continuous series in cultures of young growing bacteria and its multiplication bacteriophage behaves like a living organism. But these characters, as applied to an invisible object, may not be absolutely convincing and for those who are not convinced it will be convenient simply to replace the term " bacteriophage " by that which is also frequently used, " lytic principle." D'HERELLE describes the bacteriophage as an autonomous, living, strictly parasitic organism belonging to the group of filterable viruses, which multiplies at the expense of, and causes the dissolution of, bacteria. He restricts its character further by maintaining that " there is but one bacteriophage, but as isolated from the organism there is an infinite number of strains." To this parasite he has given the name *Protobios bacteriophagus*.

The main dissentient theories may be summarized as :—the theory of KABESHIMA (1920) of production of a defensive secretion by the intestinal glands acting as a catalysator on the proferment contained in all bacteria to cause their digestion ; the bacterial disintegration or living filterable, fragment (" Splitter ") theory of BAIL (1921a) with its later addition of derivation from chromosomes (1923) ; perhaps most important of all, either in its first form or in its modifications, the theory of an inherited though originally acquired autolytic power by bacteria of BORDET and CIUCA (1921) ; the gene theory of WOLLMAN (1920, 1927) based on DARWIN'S " pangene " theory of transmission of acquired characters and on BORDET and CIUCA'S theory of hereditary transmission of an acquired power of autolysis by the bacterium ; the theory of HADLEY (1927, 1928) in which the bacteriophage is " either a definite stage in the cyclogeny of the bacterial species, or a functionally active particle accessory to one of these stages " ; and the theory of ferment-like action of colloidal particles of bacterial cytoplasm of OTTO & MUNTER (1924). These various theories are of two types : (1) the agent is a living ferment , (2) the agent is a non-living ferment.

Bacteriophagy. Transmissible Bacterial Lysis.

Early attempts to isolate a bacteriophage for the *Vibrio cholerae* were not very successful. This was attributed to the high mortality of cholera and the difficulty of getting convalescents at the right stage to supply a satisfactory phage from the faeces. The phenomenon of bacteriophagy was worked out and demonstrated, in the first instance, almost entirely with organisms other than those of cholera and plague. In recent years, however, the phage for cholera, and to a less extent that for plague, have been much studied in British India. The typical experiment to illustrate the isolation of a phage and the production of bacterial lysis, as it applies to the *Vibrio cholerae*, may be given in D'Herelle's own words : " Let us take the stool of a patient recovering from . . . cholera, emulsify a fragment of this stool in water and then filter the suspension through a porcelain filter. . . . The clear, filtered fluid contains a principle which has the property of destroying and dissolving *in vitro* cultures of the specific bacterium responsible for the disease present in the patient. If, for example, we introduce a trace of the filtered stool of a cholera convalescent into a fairly turbid culture of the cholera vibrio this culture will become perfectly clear after two or three hours ; all of the vibrios will have become dissolved. . . . If, then, we introduce a trace of this limpid liquid into a second turbid culture of the vibrio the same phenomenon of dissolution takes place . . . and this operation can be repeated indefinitely without the phenomenon of dissolution exhibiting any reduction in rapidity or intensity." In this experiment there are exhibited the most important characters of the bacteriophage-lysis of a bacterium, filterability, and transmissibility or subculture in series with living and growing bacteria. One of the main characters of the phage is that it requires for its propagation the presence of living organisms and it agrees in this respect with the filterable viruses which can only be grown in the presence of living cells. The high degree of activity of a potent phage can be demonstrated by means of the same type of experimentation but with a dilution of the original stool filtrate to as much as 1 in 1,000,000 or more. A bacteriophage, which is isolated from the stool of a cholera convalescent, will usually act most upon the *Vibrio cholerae* itself, although it may also exercise a weaker action upon related vibrios. Specificity of action with regard to a single organism is not, however, an invariable rule with bacteriophages and some may be active towards entirely unrelated species of bacteria. Thus, for example, Ciuca (1923), who does not consider the cholera vibrio to be capable of acquiring what, with Bordet, he calls transmissible vitiation of nutrition, found in the stools of five cholera cases, four of which recovered, a phage which was active not to the cholera vibrio but to *Bact. coli* and *Bact. dysenteriae*. In these cases presumably the phage was simply the common intestinal phage. The same applies probably to the anti-plague phage found in canal water by Flu (1927) which dissolved both *Bact. coli* and *Bact. dysenteriae* (Shiga). D'Herelle has altogether opposed the conception of different species of bacteriophage, whether they have a restricted action towards one bacterium or a wider range. Topley and Wilson (1929) consider that he has burdened his theory unnecessarily by thus asserting the unity of his phage viruses.

Plague is not an intestinal disease but D'Herelle apparently believes that its phage is primarily elaborated in the intestine. Its appearance in other situations and other fluids may be due to passage from the intestine, to contamination with faecal matter, to transport by macrophages or to entry into the circulation. His first name for this organism was *Bacteriophagum intestinale.* The experiments and the views of BORDET and CIUCA (1920 a, b) are perhaps the most widely quoted in opposition to those of D'HERELLE. In their experimentation BORDET and CIUCA filtered the leucocytic exudate which occurred after 3 or 4 intraperitoneal injections of *Bact. coli* at intervals of a few days and found this to be lytic. It is interesting therefore to find that MEISSNER (1924) beginning with intraperitoneal inoculation of *V. cholerae* and cholera serum, obtained a cholera phage from the exudate, but that a proportion of her guineapigs also yielded a lysin from exudate obtained by injection of simple nutrient bouillon. She found, moreover, that the guineapigs which did not yield a lysin with bouillon also failed to yield any lysin after inoculation with cholera-serum mixture. In barbone, which is a pasteurella disease—the plague or haemorrhagic septicaemia of water buffaloes—it was from the faeces of the recovered animal that D'HERELLE (1921) isolated bacteriophage. The field of action then of the intestinal bacteriophage is not entirely restricted to the intestine. " It is capable of passing into the circulation and of inducing bacteriophagy in the fluids and in the organs " and again : " In a disease such as bubonic plague dissolution of cultures of the plague bacillus can be induced by material derived from a bubo of a plague convalescent." That phage is not more frequently found outside the intestine was explained by D'HERELLE (1922) as due to its phagocytosis and destruction by leucocytes (BRUYNOGHE and MAISIN, 1922). This fact is also used to negative the idea that phage can be of leucocytic origin. The existence of plague phage outside the intestine has been shown by ADVIER (1932 a and b) in blood and by PONS and DURIEUX (1932) in bubo fluid.

Although the phenomenon of bacteriophagy has here been first described in its classical experimental form of the action of a stool filtrate upon a young bouillon culture of cholera vibrios, this is probably not the most important method of demonstration . When such a young culture is inoculated very lightly with its bacteriophage, plate cultures made from this suspension on nutrient agar and the plates incubated, it will be found that, if all the conditions required have been fulfilled (appropriate potency of phage, appropriate dilution of the phage and sensitivity of the vibrios), there will be seen upon the surface growth which takes place a certain number of more or less circular areas generally called plaques, within which no growth has taken place. These are the so-called colonies of bacteriophage. They may vary in size from that of a pin head up to 4–5 mm. Clearance of growth occurs where the cholera vibrios have been dissolved. This mode of demonstration of phage is most important for two reasons. It affords in the first place one of the chief arguments for the particulate nature of the bacteriophage. If the addition of phage has been very light the plaques will be discrete, if massive they will be confluent and if massive and highly potent there may be no growth at all, for the organisms will all have been killed and dissolved by the bacteriophage. " Size of a phage," say ELFORD and ANDREWES (1932), " is an important factor in controlling the size of plaque produced. Small phages tend to give rise to large plaques on agar and conversely." By means of dilution of phage and the procural of discrete plaques it is, in the second place, possible to elaborate a method of estimating the concentration of phage in exactly the same way as is done for bacterial suspensions. Now if the plates with their areas of clearance or plaques are still further incubated it is found that after a certain time small colonies develop in these clearance areas. The same happens with the bouillon culture which has first been rendered limpid: it becomes turbid again. Here we have evidence of the development of secondary colonies or culture composed of a strain of cholera organisms which is resistant to the action of the phage, a lyso-resistant strain of vibrio.

Strains of any bacterium, say the cholera vibrio or the plague bacillus, are divisible, from the phage point of view, into lyso-sensitive and lyso-resistant. Lyso-resistant organisms are again sub-divided into lysogenic and non-lysogenic. A lysogenic organism is one which is accompanied by its phage. It must necessarily be resistant, for it could not exist and yet lead to the production of the specific lytic principle or bacteriophage. The colony, which contains lysogenic organisms, will on plating out yield colonies of all three kinds, that is the lyso-sensitive and the two varieties of the resistant organism the lysogenic and non-lysogenic. With successive transplants in liquid media it is found that, ultimately, transfer to agar will furnish only lysogenic organisms. A lysogenic organism may, however, still be sensitive to a phage from some other source. The explanation of lysogenic strains will vary according to the bacteriophage theory which is favoured. They are, according to BURNET (1930), " most frequent in the least specialized forms " of bacteria, as is also relative resistance to phage. According to him the most reasonable way to co-ordinate the facts is to believe that lysogenesis and associated resistance form part of the physiological make-up of the more primitive bacilli. D'HERELLE, on the other hand, explains this character of bacterial lysogenesis as an example of symbiosis between bacteriophage and bacterium. Such symbiosis he regards as " extremely frequent in nature." Among 18 strains of *V. cholerae* tested, NOBECHI (1926 a) found 6 resistant and non-lysogenic, 9 sensitive and non-lysogenic and 3 resistant and lysogenic. The symbiosis between bacterium and phage is in some respects analogous to that between bacterium and host observed in chronic carriers. The cholera vibrio when it is the subject of symbiotic association is not necessarily manifestly lysogenic (ASHESHOV, 1932, p. 141): it is not till such a bacterium is itself lysed that this phage is liberated into the ambient fluid and appears in a filtrate.

Lytic action, then, on sensitive bacteria is the main distinctive characteristic of a bacteriophage. This action may be watched under the microscope and consists of swelling and spherulation of the affected organism, development of granularity and finally a disintegration, which may take place rather suddenly. Phage is even supposed to have a positive chemotaxis for susceptible bacteria. D'HERELLE himself however, seems to reject the view of positive tropisms in his remarks with regard to the enterotropism claimed for the cholera vibrio. The attack of phage upon the bacterium has been compared to that of a malarial parasite upon an erythrocyte with rupture of the latter and liberation of the proliferated parasite. Secondary colonies, as has been explained, arise in the plaques produced by phage action. Besides being resistant to lysis these colonies, and the organisms of which they are composed, may exhibit highly important differential characters such as mucoid growth and alteration of agglutinability, of antigenic action and of virulence, characters indeed which, in the main, distinguish the " rough " variant from the normal or " smooth " variant of a bacterium. The subject belongs properly to that called " dissociation," but is considered to some extent later in its relation to mutation of the cholera vibrio and the plague bacillus.

Filtration of a lysed growth has given a filtrate from which, according to some workers, a growth of the lysed organism has been obtained. If this be so, it would signify the existence of filterable forms (ultraforms) in the life cycle of the bacteria. The fact itself, however, is contested, among others by BRONFENBRENNER and MUCKENFUSS (1927) and is ascribed by them to failure of the filters or technique. The subject is a very important one. For cholera these are "protovibrios," which then develop into the ordinary bacterial forms.

Some phage experiments may be fallacious for the reason that it has not been realized that the strain of organism used is itself lysogenic. Thus the phenomenon of bacteriophagy is full of pitfalls for the unwary investigator. Mention may be made in this connexion of the ubiquitous occurrence of the bacteriophage, or perhaps one might say the ubiquitous occurrence of faecal contaminations, as a source of fallacy in experimentation. Contamination is much more difficult to avoid in dealing with phage than in dealing with bacteria.

The source of phage is according to D'HERELLE the intestine. It does not make its first appearance during a disease, for it is already present in the intestinal contents and is continually developing at the expense of the common *Bact. coli*. Thus it is already apparent in the intestinal contents 7 to 8 days after birth. The bacteriophage, which by growth *in vitro* or *in vivo* has become "adapted" to a special organism, can of course be administered in disease and D'HERELLE claims splendid results in dysentery, cholera and plague. As, however, different phages may be more or less specific, more or less polyvalent, strong or weak, it is very essential that a careful selection of them should be made for use and especially that they should be of maximal virulence.

The subject of adaptation of the bacteriophage to a bacterium is one of the greatest interest in bacteriophagy. It may, as has been said, be adapted in nature to more than one species, but the acquirement of activity towards one given species is probably the most important characteristic of the phage from the point of view of infective disease.

The course of cholera is, according to the theory propounded, dependent on how quickly the *common* intestinal phage becomes *adapted* to the cholera vibrio in the sense of becoming potent to destroy it. Therapeutic phage must be highly active towards the specific organism. This form of adaptation is brought about by growing the phage, or bringing the appropriate stool filtrate, in contact with young growing organisms of the requisite species. The filtered liquid of these cultures is passed in succession to fresh cultures until the habit of solution or the lytic adaptation is manifest and maximum. It may be well to give D'HERELLE'S definition of maximum virulence here, as that exhibited "when a single corpuscle added to a broth tube containing 250 million organisms per c.c. gives complete and permanent dissolution when held at 32°C. Practically speaking this degree of virulence can only be obtained with some Shiga and staphylococcal phages" (BURNET 1930, p. 474). It may be accelerated by using a mixture of the organism for which the phage is originally active with what is called, on analogy with fermentation, the substrate organism. If the phage is originally weakly active to the substrate organism, that activity will be greatly enhanced by passage with that organism alone. Such subpassage of the phage does not necessarily mean loss of other activity. COUVY (1932), however, seems to indicate that lytic power may at least become restricted as regards range of action on different strains of the same plague bacillus by adaptation. The possible range of action of the phage towards various bacteria, although theoretically indefinite, is actually limited and may even be limited in the case of strictly intestinal bacteria. D'HERELLE with picturesque phrase emphasizes the importance of adaptation as a factor in the struggle for existence of the human being when he says : " Undergo adaptation or die, such is the dilemma confronting all human beings "—and presumably also all bacteria and all bacteriophages. The classification or " typing " of phages as regards range of action of the phage towards groups of individuals *within the species* is especially important in the case of cholera and receives its proper consideration under the head of phage specificity. The question of specific adaptation is complicated by the existence of latency of the lysogenic character in the test organism, by what is regarded as symbiosis and by the occurrence of contamination.

Bacteriophagy and Mutation of Bacteria.

Much might be said on the subject of mutation and the significance of that conception for bacteria. What, however, is evident as regards the relationship of the bacteriophage to this bacterial phenomenon is that the phage is one of the most powerful agents in bringing about the change. Some of the changes brought about are set out by D'HERELLE as :—motility, morphology, capsule formation, mucoid secretion, chromogenesis, proteolytic power, fermentative power, agglutinability, virulence and the formation of filter-passing forms. Almost all of these are exemplified in the case of the cholera vibrio. Dissociation is another term which has to be considered in this connexion, as should also the characters of " roughness " and " smoothness," applied to the colonies resulting from dissociation. The main characters of the rough (R) colony, in contrast to the smooth (S) type, as given by HADLEY (1927), are resistance to bacteriophage lysis, greater viability, increased susceptibility to phagocytosis, sedimentary form of growth in broth, modified antigenic and serological qualities and diminished virulence. Now these are frequently the characters possessed by resistant secondary cultures, which develop in the course of the phenomenon of bacteriophagy. The modifications of character induced by microbic dissociation are, in D'HERELLE's opinion at least, simply induced by the bacteriophage, are proportionate to the resistance of the bacterium, may be reversible and are the visible evidence of a reaction on the part of the bacterium to a pathogenic agent. Mutating or dissociating strains of organisms are not regarded by D'HERELLE as normal strains. They are strains affected by a chronic disease due to the presence of a foreign parasite, in this case the phage. One cannot, however, regard roughness as synonymous with resistance to phage, as is brought out by MORISON (1932 a), who states that Type A phage " seems to be a factor in producing rough, and B & C factors in producing smooth strains." Again he says (1932 b) :—" Vibrios isolated from cases of cholera are usually smooth," but batches were found towards the end of a Calcutta epidemic which were mostly rough and resistant to type A phage. " Such a rough ' A ' resistant vibrio if made resistant to ' B ' or ' C ' types of phage was apparently changed to a smooth strain." So strange is the modification sometimes in the case of the *V. cholerae*, that the appearance of a secondary culture might make one hesitate to identify it on morphological grounds (NOBECHI 1928 b). This is evident also from the statement of D'HERELLE who describes the extreme resistant stable coccus form obtained by repeated transfers of young secondary cultures of dysentery, typhoid, paratyphoid, coli and cholera organisms as " an organism whose cultural and morphological characteristics are identical with those of the enterococcus." The importance of this theme of dissociation of bacteria is at once appreciable when we point out that the *Vibrio El Tor* has been claimed to be a true cholera vibrio " contaminated " with phage (DOORENBOS, 1932), that is to say symbiotic with and therefore resistant to cholera bacteriophage. Again the *Pasteurella pseudotuberculosis rodentium* is regarded by ZLATOGOROFF and MOGHILEVSKAIA (1928) as a rough (R) form of *Past. pestis.* Thus it may be said that the phenomena of " dissociation " and " bacteriophagy " raise the question of how far cholera-like organisms and plague-like organisms are mutants, or probably better variants, of the organisms which we know as the cholera vibrio and the plague bacillus. Very interesting information on the antigenic structure of *Past. pestis* and *Past. pseudotuberculosis rodentium* is given by SCHÜTZE (1932). HODER (1925) speaks of the definite possibility of transition of *Bact. coli* to paratyphoid-like forms in nature. D'HERELLE affirms that a bacterial strain which is contaminated by phage is recognizable just because it gives, on plating out, mutant colonies. Colonies of an ultra-pure strain are all identical (D'HERELLE, 1926). This statement is denied altogether by HADLEY (1927) as quite insufficient to explain dissociation. The subject of transformation of non-haemolytic to haemolytic organisms, of agglutinating to non-agglutinating, of weak indol producing to strong indol producing is one of great importance in the case of the cholera vibrio. Such transformations are described by SONNENSCHEIN (1930), by BIANCHI and GALLERIO (1931) and by DOORENBOS (1932). The conversion of a non-haemolytic typhoid bacillus to a haemolytic by phage action is regarded by BIANCHI and GALLERIO as being only the intensification of a property which primarily belongs to that organism, " even if it be only in quite a small degree." The application of this doctrine to the cholera vibrio is obvious. PASRICHA, DE MONTE and GUPTA (1931) conclude, for quite a number of characters, that there is some bacteriophage and serological relationship between the true cholera vibrio and the cholera-like forms Many of these latter they think are mutation forms of the true cholera vibrio and play a great part in the etiology of the disease. D'HERELLE also upholds the doctrine that non-agglutinable, so-called pseudocholera vibrios are altered cholera vibrios which have lost their agglutinating and pathogenic properties under the influence of the phage (1928). But it would be a mistake to imagine that all are in agreement on this subject of transformation of species or mutation. Quite recently MORISON (1931) has especially dealt with the repetition of experiments on change over of " true cholera " agglutinating vibrios to non-agglutinating. His conclusion in this case was that the alteration obtained was probably due to the occurrence of bacterial contaminations.

Specificity and Types of the Bacteriophage.

It may be asserted firstly that the bacteriophage does not appear to have the specificity of the pathogenic bacteria. Whether bacterial species themselves are really good species, however, in the zoological or botanical sense might be argued further. Each phage according to SEIFFERT (1925) has its own circle of action. There is no specific typhoid or dysentery phage. One and the same phage can dissolve typhoid, coli, proteus, etc. BURNET (1933) concludes, from all the evidence at present available, " that bacteriophages (1) are independent micro-organisms, viruses which are obligate parasites or symbionts of bacteria, and (2) that there are many different types of bacteriophage, which may differ widely in particle size as well as in almost every activity by which a phage can be characterized." With regard to the bacteriophage as an organism, D'HERELLE has definitely pronounced that there is but one species of phage. Under normal conditions it is a parasite of the intestinal bacteria but is capable of a high degree of adaptation to pathogenic organisms. He speaks, however, of " races " of phage, some with " a specificity so strict that they attack but a single strain even to the exclusion of all other strains of the same species. Other bacteriophage races attack all strains of a single species, and, finally, still others attack all strains of several species, sometimes the strains being but very remotely related." A high degree of species specificity was found by SUGINO (1932) in a plague bacteriophage obtained from three laboratory strains of the bacillus, which was inactive even to allied organisms of the pasteurella group. There are fewer characters for bacteriophages than for bacteria by which species can be differentiated, if such species really exist. Morphological differences are obviously excluded in the case of a wholly ultramicroscopic object. The characters which are available for the separation of phages are size, the resistance of bacterial strains to their action and the specificity of the antisera developed towards phage antigen. It is also definitely stated (WOLLMAN 1927) that antibacterial sera have no effect whatever on phage. The two characters, bacterial resistance and phage antigenic specificity, seem to be at all events highly singular and therefore in one sense of the term specific. Absorption tests appear to be of value in separating phages or in differentiating them. Resistant strains of cholera vibrio do not absorb phage, while susceptible strains do (NOBECHI 1926a). These tests, if they have not yet served for the creation of species, have at least been the means of subdividing phages into " races " or " types."

D'HERELLE regards the bacteriophage as possessed of a " mosaic " of virulences, by which is meant a congeries of more or less highly developed lytic potencies towards different bacterial species Each of these may be enhanced or may be developed by adaptation of the phage towards a specific bacterium. This phenomenon of adaptation is very important and is usually to be observed by growing phages under suitable conditions in a succession of cultures with the organism for which they may have been originally inactive or only weakly active. Theoretically at least it is to be presumed that the bacteriophage could be made lytic by adaptation under suitable conditions to any bacterium.

We may here consider the subject of typing of cholera bacteriophage. The method was introduced by ASHESHOV (1930) and is dependent essentially on the development of resistance in series and the discovery of new bacteriophages for each successively established resistant strain of bacterium. The number of such types would appear to depend largely on the time available to and the industry of observers, always remembering that with each successive addition of a new type or strain further additions become more and more difficult to obtain. The cholera phage types, which have been given letters of the alphabet to distinguish them, have now reached the letter J in the hands of MORISON and his co-workers (1932 a). At the same time, as BURNET (1930) points out, while characteristic differences between phages lysing one organism can often be detected immediately from the appearance of the isolated plaques, these " remain very constant to type in successive ' generations ' of the same phage, but often differ greatly for phages of different origins." The points in which plaques differ are, size, nature of edge, halo and degree of secondary growth. In very brief description the method of phage typing, taken largely from ASHESHOV's and MORISON's descriptions, may be given as :—A number of cholera bacteriophages are, say, isolated in pure line cultures. These are obtained by eliminating other types by a process of dilution from cholera cases on their way to recovery. With one of these a young growing culture of cholera vibrios is inoculated and, after lysis has taken place, a secondary growth of resistant cholera vibrios is obtained. By testing this resistant growth with the other cholera phages some one or more of the latter will be found to lyse this resistant strain and so we get a second type of cholera phage. In the same way a third phage may be obtained and so on. ASHESHOV called his types A, B and C and these seem to be the main types, so far as Indian distribution is concerned. It is contended by ASHESHOV that any bacteriophage which is to be used prophylactically or therapeutically in cholera should contain all three types—" An emulsion of vibrios if acted upon by all the three types of bacteriophage combined is usually destroyed completely unless the bacteriophages are of low virulence." The *caveat* here inscribed with regard to the possibility of low virulence is of great importance therapeutically, for through it we are introduced to the possibility of an administration of phage actually doing harm by insufficient action and to the occurrence of unexpected events in the epidemiology of cholera. PASRICHA, DE MONTE and GUPTA (1932) and MORISON (1932 a) have added to these types.

More than one method may be adopted for the isolation of types and identification of mixtures of phage. In general terms the most certain is that which sets out ribbon cultures, in parallel on agar, of a succession of vibrio strains, each of which has been made resistant to all but one of the standard types of phage available, together with one strain resistant to all the phages. On each of these bands of growth the test and standard phage filtrates are set out, one horizontal row of drops for each of the phages, A, B, C, . . The plates are incubated overnight and then examined. Plaques will be found so distributed as to enable one to judge which bacteriophage is identical with which and whether the test phage is a new one or one already isolated. Very good plates in illustration of this method of testing for types of phage are given by MORISON (1932 a). By this method it is possible to pick out bacteriophages belonging to one of the already isolated types, to diagnose a mixture of types, or to discover a new type. As expressed by MORISON (1932 a) it is the method of using single strains of cholera vibrio made resistant to n types of bacteriophage taken (n-1) at a time with the addition of one strain made resistant to all of the n types in order to detect the appearance of an entirely new type. A new method of determining the type of a phage or of isolating it in pure condition has been devised by ASHESHOV (1933), which is dependent on the high specificity exhibited by antiphage sera. The sera used are called "Minus one Type" sera and each inhibits the development of all the " laboratory types of phage against a bacterium except one which is called the missing type." The technique, for the three phage types A, B, and C, is given by ASHESHOV as :—Mix in each of three small tubes one drop of phage suspension and one drop of the three sera. Incubate overnight. Next day spread a normal culture of cholera vibrio in a column on agar. When dry, put one droplet from each tube on the spread culture. The result can be read in 8–10 hours. The method of classification of cholera types above described is that of ASHESHOV. BAIL (1923) first used the size of the plaques formed—large, medium, small—provided they show constancy of appearance as one of the differential characters of phages. The plaques characteristic of cholera phage types have other distinctive characters than size to distinguish them. "The plaques of A type have sharply defined margins and inside the plaques there are frequently small bacterial colonies. Those of B type have margins less sharply defined and secondary colonies of the vibrio are not so frequent. Those of C type are frequently surrounded by a halo similar to the halo which SERTIC (1929 a) has shown is due to a lysin, which diffuses out into the agar from the area to which the bacteriophage itself is confined" (MORISON, 1932 a). ASHESHOV'S division of bacteriophages into groups consisting of the respective types, "means that each member of each group can act upon and destroy the secondary growth of vibrios which has acquired resistance to the action of a bacteriophage belonging to one of the remaining . . . groups."

Differences of action are observable among the different types of phage. Thus type A is quick to act, unstable, delicate in action and restricted in range of action to "smooth" strains of *V. cholerae*. It is probably much more delicate than has hitherto been thought. The more stable races of this type are not very polyvalent inasmuch as they, at most, attack only about 30 per cent. of freshly isolated cholera vibrio strains (ASHESHOV, ASHESHOV, KHAN and LAHIRI, 1930). "Types B and C are almost omnivirulent. . . . They act even on some non-agglutinable vibrios—a fact deserving great attention" (ASHESHOV, 1931). In the case of plague, COUVY (1932) concludes that the specific character of a bacteriophage has no relation to smoothness or roughness of colonies nor to S and R characters of the organism. In this whole connexion one may refer to the important view of SERTIC (1929 b). According to him bacteriophage suspensions, as isolated, consist of individual phages with different characters; these are variants, which are present in different degrees of numerical proportion: these may be isolated as individuals, that is to say, in the present connexion, types, by plating out the phage suspension upon bacteria partially immunized, thus rendering the plaques of the minority variant visible. In this way there may then be obtained a series of variants which act on resistant secondary cultures of the corresponding bacterial species. The contention again of RAO (1932) is that there can be an infinite number of grades of cholera vibrio with characters ranging continuously from the extreme "smooth" to the extreme "rough." In that case the types of phage which have been isolated and continue to be isolated might conceivably be related to individuals possessing an antigenic constitution describable as a greater or less degree of smoothness or roughness. A discussion of the relation of antigenic structure of organisms and phage action will be found in publications by BURNET (1927, 1930 a and b and 1932). The existence of a number of types of cholera bacteriophage is of the highest importance in connexion with treatment. Mention has been made in this connexion of the specificity of antiphage sera. This is of high degree and extends even to phage types, a proof, according to ASHESHOV (1932) that these types are antigenically differentiated from one another.

[*To be concluded.*]

TYPHUS AND TYPHUS-LIKE DISEASES.

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Introductory.

It seems but a few years since we were accustomed to look upon typhus fever as a definite single entity. This disease had emerged from the welter of jail and famine fevers and the pestilences of armies where previously it had been confused with relapsing fever, typhoid, dysentery and other filth diseases. Typhus fever was regarded as an epidemic contagious disease which spread like wildfire through a country, a city, an army or an institution and destroyed from 30 to 60 per cent. of the people attacked, sometimes even a higher proportion; such epidemics occurred as a rule in the winter among people huddled together for warmth without means of cleanliness or change of clothing either day or night, and people who were suffering from privations and often actual starvation, not only was there an exaltation of the pathogenicity of the virus but also lack of resistance in the attacked. Of later years such devastating epidemics of typhus have but rarely been reported, although the huge epidemics in Serbia and Galicia during the War occur to mind, and since then the disease has continued to smoulder on in Galicia and in Russia and North Africa. On the other hand mild forms of a typhus-like disease have been reported from many countries all over the world.

Nicolle and other investigators demonstrated that typhus fever is conveyed from man to man by the body louse and that in the absence of lice a case of typhus is not of danger to other patients in the same room or ward. This discovery was followed by the discovery of Rickettsia bodies in the vectors

Definition of Rickettsia Topley and Wilson (After Cowdry, 1926) — "Gram-negative, bacterium-like objects of small size, usually less than half a micron in diameter, which are found often intracellularly, in arthropods, which may be more or less pleomorphic, which stain rather lightly with aniline dyes but well with Giemsa, and which resemble in most of their properties the type-species *R. prowazeki*"

Brill's disease or Endemic typhus.

In New York in 1898 Brill had first described a mild typhus fever, sporadic in nature and definitely not carried by lice nor spreading in the manner in which lice-borne typhus spreads. This disease was so similar in its clinical manifestations to true typhus, apart from the mortality rate, that when it was shown in 1912 that a guineapig which had reacted with fever to the true typhus virus did not react when subsequently inoculated with the virus of Brill's disease, also that a guineapig which had reacted to the virus of Brill's disease was immune to the virus of the true typhus, *i.e.*, a positive crossed immunity test, it was generally accepted that Brill's disease was merely a mild form of typhus and that the viruses of the two diseases were identical although the vectors might not be the same. Brill's disease was regarded as the inter-epidemic form of typhus. More recently it has been shown that lice can also be infected by anal injection with the virus of Brill's disease and that Rickettsiae appear in the cells lining the mid-gut of these insects exactly as occurs in true typhus.

Again, the Weil-Felix reaction (agglutination by serum of typhus patients of certain strains (X2, X19) of Proteus originally isolated from cases of typhus) is positive both in Brill's disease and in true typhus.

Endemic typhus and Rodents : Epidemiology.

On epidemiological grounds the association of endemic typhus with rats and grain stores was suggested by HONE (1922) in Australia, and by MAXCY (1926) in America, but the actual experimental proof was not forthcoming until 1931 in America where MOOSER, DYER and co-workers fully and conclusively proved the role of the rat and the rat flea as carriers of the virus. DYER and his co-workers (1931, 1932) collected rats from areas (Baltimore and Savannah) where numerous cases of endemic typhus had occurred. The rats were chloroformed and fleas collected from them. These fleas were identified as *Xenopsylla cheopis* and *Ceratophyllus fasciatus*, the former in the majority. An emulsion was made of these fleas and was injected intraperitoneally into guineapigs ; these animals reacted after an incubation period of four days and developed fever with swelling of the testicles, exactly the same reaction as follows injection of the virus of endemic typhus. About the same time in 1931 MOOSER, RUIZ CASTAÑEDA and ZINSSER in Mexico were able to demonstrate the presence of the endemic typhus virus by means of injection into guineapigs of the brain of wild rats caught in endemic areas. DYER and his co-workers have gone further and have been able to show that *X. cheopis* fleas become infected when fed on infected white rats and can convey the infection to other white rats in separate cages. It has also been shown by the same workers that the virus multiplies in the flea and that the faeces of the fleas are infective. Rickettsia bodies can be demonstrated in the infected fleas. DYER sums up as follows. "The rat flea *Xenopsylla cheopis* as a vector of endemic typhus meets the requirement of the epidemiological evidence."

BRUMPT and other workers in Europe have confirmed DYER's results but BRUMPT (1932) working in Paris, where endemic typhus has not been recorded for many years, found a higher percentage of rats infected with the virus of endemic typhus than did MOOSER and other American workers in endemic areas. BRUMPT sounds a note of caution and asks, is this virus that we can isolate so readily from wild rats by inoculation into guineapigs a true typhus virus, or is it merely a virus of rats not communicable to man ?

That Brill's disease, endemic typhus, does not spread as does plague is due to the fact that the virus does not remain in the rat for many days and that the rat does not die of the disease, hence the flea populations have not the necessity to seek an alternative host but remain on the rats or in the rats' nests throughout their lives ; in plague the infected rats die and the fleas pass on to other rats which in their turn die and finally fleas are driven to overflow on to man ; some of these fleas are heavily infected with plague bacilli (blocked fleas) ; such a condition of mass infection with Rickettsia does not arise in the flea in endemic typhus.

Relation of endemic to epidemic typhus.

The epidemic spread of louse-borne typhus is due to the fact that no animal host is necessary, the infected lice passing directly from man to man either on the death of the infected person or driven to transfer from one man to another by reason of the high temperature of the infected person. The lice in epidemic typhus can be shown to be heavily infected with Rickettsia, not so the *Cheopis* flea in endemic typhus.*

This difference in the vector of the two diseases also accounts for the fact that true typhus is a disease of the winter and of crowded insanitary places, whereas Brill's disease occurs in the warm weather and is not necessarily associated with insanitary or crowded humanity except in so far that there is generally a close association with rats and their breeding places. An instance of this is the occurrence of Brill's disease on board the French cruisers in Toulon Harbour; the men sleeping in the tween decks were found to be infected with endemic typhus and rats were discovered to be breeding between the steam pipes which led along these decks, the rats running over the sleeping men in their hammocks at night, the necessary temperature for the multiplication of the fleas and the virus being thus artificially maintained by the steam pipes both in summer and winter.

Other forms of typhus.

In 1910 a mild form of typhus fever similar to Brill's disease was described as occurring in Australia, in North Africa and also in South Africa, and during the War (1916–17) very numerous cases of trench fever, a mild but prolonged fever with rash, were noted and it was demonstrated that this disease was carried by lice and that Rickettsia appeared in infected lice; curiously enough these bodies were found free in the lumen of the alimentary canal and not enclosed in the epithelial cells lining the midgut as are the Rickettsiae in true typhus in the louse.

Little more was heard of these typhus-like diseases for some few years until in 1916 MEGAW described a typhus-like fever in the Kumaon hills in India; he himself suffered from this disease and was of opinion that the disease was carried by a tick (tick typhus). Up to the present (1932) transmission by the tick has not been definitely proved by experiment in India, but PIJPER and DAU in South Africa (1931) fed the larvae of ticks (*Amblyomma hebraeum* and *R. sanguineus*) on a volunteer; ten days later fever developed with intense headache and papular rash (tick typhus, tick-bite fever). The Weil-Felix reaction in this case was carefully tested throughout the fever and during convalescence; twenty-one samples of blood in all were taken and three strains of Proteus, X19, X2 and XK, were used. The titre for all three commenced to rise during the incubation period and reached 1/100 at the beginning of the fever; the peak of the curve was reached on the 22nd day although the fever ceased on the 19th day, reckoned from the date of the bite. The titre for the XK strain was much higher, 1/400, than that for X19 or X2.

Following on MEGAW'S suggestion similar diseases were described in Australia by HONE (1922), in the United States by MAXCY and in Malaya by FLETCHER (1925).

Tropical typhus.

Six cases of typhus-like fever occurred in a military camp near Kuala Lumpur, F.M.S., and the officer in medical charge, who recognized these cases as out of the common, called in the aid of the Institute for Medical Research; the cases were thoroughly investigated by the then Director, Dr. W. FLETCHER (1925); other similar cases came to light and FLETCHER was able to show that there were in the Federated Malay States two forms of mild typhus, one occurring in the towns and spreading among people dealing with grain, the other occurring in the country, especially on the plantations, and having a close association with the clearing and pruning of the palm trees.

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* Rickettsiae are not found in the lumen of the gut in *X. cheopis* owing to the presence of a peritrophic membrane, but they may be numerous in the epithelial cells of the stomach (MOOSER and CASTANEDA, *Bull. of Hyg*, Vol. 7, p. 354).

FLETCHER was also able to separate these two forms of the disease serologically; in the urban disease (Brill's disease, endemic typhus—rat flea) the serum of patients was found to agglutinate the ordinary strains of Proteus, X19 and X2, whereas the serum of the scrub or rural typhus patients did not agglutinate these strains but did agglutinate a variant of X19, the so-called Kingsbury strain XK. The actual vector of scrub typhus has not yet been definitely incriminated but on epidemiological grounds it is probably a mite or a tick.

Japanese River fever can hardly be called a *mild* form of typhus, although clinically it is a typhus-like disease and is known to be carried by a mite; in this disease the serum of the patient agglutinates XK and not X19. In Rocky Mountain fever, a typhus-like disease of high mortality definitely proved to be carried by a tick, in which animal Rickettsiae can be readily demonstrated, the Weil-Felix reaction is positive both with X19 and XK (FELIX). In neither of these diseases is reaction well marked, *i.e.*, a positive reaction is obtained only in low dilutions and it would appear that the reaction is rather of the nature of a group reaction, and until homologous proteus strains are isolated from cases of the two diseases the reaction will continue to be indefinite.

Fièvre boutonneuse: its relation with the typhus group of fevers.

Since 1910 a typhus-like disease has been known to occur on the Mediterranean Littoral, first described by CONOR and BRUCH (1910) in Tunis as "fièvre boutonneuse." It has later been shown to occur also in Marseilles and in many other districts in Southern France; also in Italy, Portugal, Spain, Greece and Rumania where it has been known as "eruptive fever," fièvre exanthématique. This disease has now quite definitely been shown by DURAND and CONSEIL (1930) and BRUMPT (1930) to be carried by the common dog tick *Rhipicephalus sanguineus*, and although it has not yet definitely been decided that the dog is the reservoir of the virus, these animals have been shown to be susceptible and their blood infective for man and monkeys.

In this disease, at the site of the tick bite, there is a primary sore or ulcer, "tache noire," with lymphangitis, just as occurs in tick-bite fever in South Africa (TROUP & PIJPER, 1931) and in Japanese River fever.

French observers are loth to admit that exanthematous fever (eruptive) belongs to the typhus group, and the points of difference stressed by them were that the Weil-Felix reaction was negative and that guineapigs are not susceptible to infection, also crossed immunity experiments with typhus virus were negative.

Male guineapigs infected with the virus of endemic typhus, whether from man, the rat or the flea, react in a typical manner; after an incubation of four or five days fever occurs and later a marked oedema, redness and swelling of the scrotum appears. "The Neill-Mooser reaction," a similar reaction, occurs in guineapigs infected with Mexican typhus virus, but the virus of true typhus (epidemic or Old World typhus) produces only fever in the guineapig usually without scrotal reaction; so far this reaction had not been obtained with the virus of eruptive fever, but quite recently it has been shown by CAMINOPETROS (1932) in Greece that if an emulsion of infected dog ticks is injected into guineapigs these animals react exactly in the same manner as they do when an emulsion of infected *Cheopis* fleas is injected, *i.e.*, with fever and scrotal reaction; also it has now been shown that the Weil-Felix reaction (X19) is positive in Marseilles fever. These points of difference having been met, this disease can therefore also be associated with the mild typhus-like disease, although it has been shown that the virus of Brill's disease does not protect a monkey from the virus of Marseilles fever or *vice versa*.

According to FELIX (1930) failure to obtain cross immunity between typhus and typhus-like diseases might be due to unequal content of two antigens or to differences in antigen such as occur in serological types of bacteria.

Endemic typhus : Relation to the vector.

It is possible that such differences as do exist between these various forms of typhus are due to the differences in vector. For example the virus of Japanese River fever in Japan produces but a mild reaction in guineapigs but the virus of the same disease in Cochin China produces a severe and frequently fatal disease in these experimental animals; if such differences in virulence and behaviour of the virus occur when it is merely a case of a change from one species of mite to another what changes might we not expect when in the one instance the vector is a louse and in the other a flea or, again, a tick. Another instance of the change in the pathogenicity of virus is that of Rocky Mountain or spotted fever; this disease has now been shown to occur in the Eastern States of America as well as in the West; previously in the East the disease had been confused with Brill's disease. Now in the Western type (Rocky Mountain fever) the fatality is high (30 to 50 per cent.), whereas the Eastern type is a mild form of the disease, rarely if ever, fatal, and in this resembling endemic typhus. This change in virulence is possibly due to the fact that a different species of tick is responsible for the conveyance of the disease in the Eastern States.

Rickettsia.

As has already been mentioned, Rickettsia bodies have been demonstrated in the vectors, where known, of these diseases: in the louse, in the tick, in the flea, and in the mite; WEIGL, who utilized a special injection method for infecting lice, employed a very heavily infected fluid from these animals as a Rickettsia vaccine (Weigl) vaccine. He and other workers have shown that if this fluid, rich in Rickettsia, is utilized as an antigen for agglutination tests these small bodies are agglutinated by the serum of convalescents from typhus and not by the serum of normal people. ZINSSER has repeated this work and has found that the peritoneal fluid of irradiated infected rats contains very numerous Rickettsia bodies and that this fluid can also be used as antigen for agglutination tests. ZINSSER employed two viruses, one, that of European typhus, and the other that of Mexican typhus, and he was able to show that the sera of persons recovered from the New World typhus fever agglutinated the Rickettsia derived from the Old World type and *vice versa*, and that the serum of rabbits inoculated with these two viruses contained agglutinins both for the homologous and heterologous strains of virus. Incidentally the sera of these rabbits inoculated with Rickettsia gave a positive Weil-Felix reaction with strains of Proteus. Rickettsia are difficult to demonstrate in the tissues or fluids of typhus patients but can be readily demonstrated in experimental animals, especially so in the fluid of the infected testicle in guineapigs (endemic typhus), or in Descemet's membrane in the eyeball of infected rabbits (tsutsugamushi disease). It might be mentioned, however, that NICOLLE has shown that when the normal tissue of a guineapig (brain or testicle) is injected into another guineapig Rickettsia-like bodies appear in the tissue fluids of the inoculated animal; this author suggests that Rickettsia-like bodies are normally present in the guineapig and multiply in response to various stimuli.

Factors linking the typhus-like diseases.

It would appear that these different forms of typhus-like diseases are very closely linked together by the following factors.

(1) The clinical picture, fever, rash and nervous symptoms; mild cases of Japanese River fever cannot, on clinical grounds, be differentiated from exanthematous (eruptive) fever, nor can the Eastern states type of spotted fever be distinguished from endemic typhus on the clinical picture alone.

(2) During the course of these fevers or in convalescence a positive Weil-Felix reaction can be demonstrated with one or other of the known strains of Proteus.

(3) Rickettsia bodies have been demonstrated in experimental animals which have been inoculated with the viruses of these diseases and/or in the insect vectors.

(4) In the diseases of the group in which careful investigation has been made a common histo-pathology has been disclosed.

Endothelial proliferation in and "typhus nodules" around the smaller capillaries of the skin, the brain or other organs have been demonstrated. It is true that in guineapigs inoculated with the virus of epidemic typhus the lesions in the brain substance, "cell glioses," are much more numerous than in the brain of an animal inoculated with the virus of the endemic disease, yet here also typical lesions can be discovered if carefully looked for. For these reasons and especially on account of the positive agglutination tests with Proteus and Rickettsia it seems but right that these types of endemic typhus should be included in one group. There is evidence to suggest that such differences as do exist between the different types are due to differences in the vector rather than in the virus.

From the public health point of view it is essential, however, that a sharp differentiation should be drawn between such endemic diseases and epidemic or true louse-borne typhus fever, The endemic disease is not spread directly from man to man, whereas epidemic typhus is. Endemic typhus is not and need not be notifiable, epidemic typhus should always be so. In the one case we have a disease of domestic animals or of small rodents only occasionally and incidentally conveyed to man, in the other case a disease conveyed directly from man to man by a parasite of man and spread in epidemic fashion. In the one case a series of broken links, in the other a continuous chain.

A table of the differences between the forms of typhus described in this review is reproduced on p. 406 of this number at the end of the "Typhus and Unclassed Fevers" Section

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YELLOW FEVER.

STEFANOPOULO (G. J.). Sur la détermination des foyers d'endémicité amaril. [**The Identification of Endemic Centres of Yellow Fever.**] —*Bull. Acad. Méd.* 1933. Jan. 3. 97th Year. 3rd Ser. Vol. 109. No. 1. pp. 26–34.

An interesting account of the author's investigations on yellow fever endemicity in the French West African colonies. Collections of sera were made in various localities, the specimens being kept in the ice chest, and brought back to the Pasteur Institute, Paris, where the necessary tests were made.

The serum to be tested was mixed with neurotropic mouse virus and after being in contact for 15 to 20 minutes at room temperature, small quantities of the mixture were inoculated intracerebrally into mice. Examples are given of some of the results obtained by the use of this test. In a dockyard where two cases of yellow fever among Europeans had occurred, the sera of 11 out of 21 natives were positive, including two children of 7 to 12 years old. Various other examples are given of the use of this test for studying the spread of the disease along lines of communication; to decide where epidemics have occurred previously; to determine whether the disease has disappeared from an endemic centre and the efficiency of measures of control; and to decide whether or not cases of the disease are really localized and introduced as, for example, the small epidemic of Grand Bassam.

Finally the sera of 21 Europeans living in regions affected by yellow fever epidemics were examined, with negative results, in marked contrast with the high percentage of positive results obtained with the sera of natives from the same localities. It would seem, therefore, that mild unrecognized cases of the disease are rare in Europeans though common among the natives.

With regard to yellow fever in French West Africa the author recognizes 4 regions: (1) Where the disease has long been absent; these must be protected. (2) Where only isolated cases of the disease have occurred. (3) Regions with frequent epidemics requiring particular attention. (4) Regions which constitute endemic foci.

E. Hindle.

DURIEUX (C.). Enquête sur la fièvre jaune dans les colonies du Niger, du Soudan et du Dahomey. [**Yellow Fever Inquiry in the Colonies of Niger, Soudan and Dahomey.**]—*Ann. Inst. Pasteur.* 1932. Dec. Vol. 49. No. 6. pp. 736–742. With 4 figs. on 2 plates & 1 map.

A general account of a tour of these three West African Colonies by members of the West African Rockefeller Commission under Dr. MAHAFFY, accompanied by the author. Collections of serum and mosquitoes were made at various places, and the results confirm the view that yellow fever occurs in the native population. *E. H.*

BEEUWKES (Henry), KERR (J. A.), WEATHERSBEE (A. A.) & TAYLOR (A. W.). **Observations on the Bionomics and Comparative Prevalence of the Vectors of Yellow Fever and Other Domestic Mosquitoes of West Africa, and the Epidemiological Significance of Seasonal Variations.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Mar. 23. Vol. 26. No. 5. pp. 425–447. With 5 figs.

In connexion with numerous epidemiological and entomological studies on yellow fever in West Africa, the authors undertook in 1930 an intensive survey of four large towns, Lagos and Ibadan in Southern Nigeria, and Kano and Zaria, in Northern Nigeria, and in addition a small village of 50 houses, Wallidazene, 110 miles east of Kano. Particulars are given of conditions in these localities that may be of interest in connexion with the epidemiology of yellow fever, followed by a section devoted to the index of breeding and mosquito population.

The index of breeding was found to be much lower in Lagos than in any of the other towns studied whilst Ibadan had the highest index. The differences between Ibadan and Lagos can be attributed directly to the piped water supply and efficient sanitary service in the latter. The lower indices of Kano and Zaria, as compared with Ibadan are probably due to the different meteorological conditions, since there is no sanitation in these towns which would effectively control the carriers of yellow fever. On the other hand the mosquito population of the northern towns as compared with house and container indices was very low, indicating that in the north the length of life of Aëdes is relatively short. It is shown that there is a high mosquito population in the north, and during the rainy season conditions favour the longevity of the insects and epidemics of yellow fever may occur, but it is doubtful whether the infection can persist through the usual harmattan season and the extensive epidemics of 1931 were only made possible by the failure of the harmattan in the early part of the year. In the north large numbers of *Mansonia africana* were captured in the houses and in Kano actually outnumbered *Aëdes aegypti*; consequently that species must be regarded as possibly of some epidemiological significance as a carrier. With the exception of these and 5 *Culex thalassius,* taken in Lagos, none of the species proved experimentally to be possible carriers, were found in any of the houses.

Longevity experiments with *Aëdes aegypti* were carried out at Yaba in the south, and Gadau in the north. The results show that the length of life does not vary to any great degree in the uniform climate of Southern Nigeria, but in the north it is only during the rainy months of June to September that the length of life approximates to that in the south. During the cold harmattan season when relative humidity was about 30 per cent. in the laboratory, insects kept in a moist chamber at 60 per cent. humidity die as quickly as those in the laboratory. At Gadau, in five experiments, under ordinary room conditions, males lived for maximum periods of 26 to 75 days with means of 10 to 43 days; the females for maxima of 45 to 109 days and means of 22 to 65 days. When kept in a moist chamber the males lived 61 to 91 days with mean lengths of 29 to 46 days; and the females 116 to 169 days, with means of 49 to 86 days. *E. H.*

MAZZA (Salvador). Comprobacion de focos de fiebre amarilla en el departamento de Santa Cruz, Republica de Bolivia. [**Foci of Yellow Fever in Santa Cruz Department, Bolivia.**]—Universidad de Buenos Aires Misión de Estudios de Patología Regional Argentina, Jujuy. Publicación No. 9. 28 pp. With 2 maps in text. 1932.

It is shown in this paper that yellow fever was present in Bolivia, not far from the Argentine border, in 1932.

On the night of the 19th April, 1932, the Commandant of the Fifth Division of the Argentine Army received the startling news that 60 per cent. of the troops belonging to a regiment of the Bolivian army stationed in the town of Santa Cruz de la Sierra, the capital of the

Department of Santa Cruz, had been attacked by yellow fever and that 75 of the civil population had fallen victims to this disease. A commission was forthwith appointed to investigate.

The regimental medical officer informed them that 60 per cent. of the soldiers had showed fever with severe jaundice and he diagnosed paratyphoid. The grounds for this are obscure since his description of symptoms was as follows: malaise, severe headache, furred tongue, epigastric pain, frequent vomiting or diarrhoea; then an afebrile period with marked debility, depression and gastric irritability. Some then began to improve, others had repeated haemorrhages, from nose, stomach, intestine, with jaundice and pain over the liver, preceding death and at autopsy the liver showed acute yellow atrophy.

Another local medical man who saw these cases diagnosed yellow fever or Weil's disease. Investigations revealed that 59 soldiers had been attacked and 4 had died, that there had been altogether 92 patients and 8 deaths. A history was given that "at a certain time of the year climatic fever attacked persons who came down from the hills or provincial districts."

Sera of some of those who recovered were sent to the Oswaldo Cruz Institute for the protection test to confirm or disprove yellow fever and sections of the liver from post-mortem cases for the changes associated with yellow fever. *Aëdes aegypti* were found in considerable numbers in and about the houses. Six of the sera were tested for agglutination of *L. icterohaemorrhagiae* with negative results; they, however, gave protection to *M. rhesus* against yellow fever virus and the liver tissues sent showed the characteristic changes. One patient gave strong agglutination of *Bact. typhosum*, another agglutinated *Proteus* X 19 and he gave a history indicative of a previous attack of typhus. A map is reproduced showing the localities where yellow fever had been reported in an outbreak in 1887. Another map of Bolivia in 1925 is so reduced as to be indecipherable; half of it resembles a letter from the War Zone obliterated by the censor. The result of the investigation, however, has been to show that by pathological changes in the liver, by protection tests with the serum of recovered patients and by fixation of complement reactions, absence of *L. icteroides* by direct examination and inoculation experiments, yellow fever is endemic in Santa Cruz de la Sierra. *H. H. S.*

HOFFMANN (W. H.). **Epidemic and Endemic Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1932. Dec. 1. Vol. 35. No. 23. pp. 359–363.

A valuable article on the importance of yellow fever from the point of view of public health.

The author considers that the measures hitherto employed, although effective in epidemics, are not sufficient to control yellow fever in its endemic areas. Moreover in spite of all warnings the situation is more serious to-day than ten years ago, for owing to changes in the political and social order of many parts of the world, there has been a neglect of hygienic measures which might well open the way for a great pandemic. It is essential that there should be international co-operation in a campaign against the disease, and what is especially needed are reliable periodic reports of the current state of endemic and epidemic infection all over the world. Finally every effort should be made to limit the disease to its two endemic foci, making them smaller and smaller, and aiming eventually at their eradication. *E. H.*

STEFANOPOULO (G.) & CALLINICOS (G.). Dengue et fièvre jaune. Le problème du typhus amaril en Méditerranée. **[Dengue and Yellow Fever. The Yellow Fever Problem in the Mediterranean.]** —*Giorn. di Batteriol. e Immunol.* 1932. Dec. Vol. 9. No. 6. pp. 972–977. [11 refs.]

A general summary of possible immunological relationships between these two diseases.

The authors also give particulars of experiments with the neurotropic virus in mice confirming previous observations which indicate that inoculation with dengue virus does not confer immunity against yellow fever, and moreover that the serum of recovered dengue patients has no action on yellow fever virus. It is also noted that one of the authors, in French West Africa, has found that there have been many victims of yellow fever in a country where dengue still exists.

With regard to the Mediterranean, the authors are of the opinion that the persistence of dengue in coastal regions denotes a possible risk of the appearance of yellow fever. *E. H*

PHILIP (Cornelius B.). **The Experimental Transmission of Yellow Fever by Mosquitoes.**—*Science.* 1930. June 13. Vol. 71. No. 1850. pp. 614–615.

The author refers to unpublished tests with *Aëdes* (*Aedimorphus*) *irritans* and *Aëdes* (*A.*) *nigricephalus*, as well as of *Aëdes* (*Banksinella*) *punctocostalis* and *Culex thalassius*, all of which were found to contain yellow fever virus after the elapse of adequate incubation periods following an infecting meal. Although these insects failed to produce infection by their bites, when ground up in saline and injected into normal monkeys they produced fatal infections. *E. H*

DAVIS (Nelson C.). **Attempts to transmit Yellow Fever Virus with** *Triatoma megista* **(Burmeister).**—*Jl. Parasitology.* 1933. Mar. Vol. 19. No. 3. pp. 209–214.

The injection into rhesus monkeys of *Triatoma megista* that had ingested infected blood produced yellow fever when the interval was three to six days; after an interval of seven days fever followed by immunity; after eight and ten days no fever, but immunity; and after fourteen days neither fever nor immunity. It is evident, therefore, that there is a gradual dying out of the virus. Faeces collected at various intervals were non-infective.

In one instance yellow fever was transmitted mechanically by the bites of triatomas after an interrupted blood meal on an infected animal. After longer intervals comparable to the extrinsic incubation period in mosquitoes, the bites failed to infect. *E. H.*

LAIGRET (J.). Sensibilité de certaines souris sauvages au virus de la fièvre jaune. **[The Susceptibility of Some Wild Rodents to Yellow Fever Virus.]**—*C.R. Acad. Sci.* 1933. Feb. 13. Vol. 196. No 7. pp. 508–510.

Mus musculus musculus, the ordinary grey house mouse, and ***Mus musculus gentilis***, an African variety, were found to resemble the white mouse in being susceptible to yellow fever virus if inoculated intracerebrally, but not to intraperitoneal injections. Another African variety, however, *Mus musculus azoricus*, Schinze, was found to be susceptible to intraperitoneal injections of the neurotropic mouse virus.

Two out of three mice died from the infection after 5 days and the third was killed and used for further inoculations. An emulsion of the abdominal viscera of this animal into white mice produced typical encephalitis when inoculated intracerebrally but was without effect when given intraperitoneally. It is conceivable that this mouse might be infected with yellow fever virus in nature. *E. H.*

STEFANOPOULO (G.). Sur le virus amaril d'origine murine inoculé à *Macacus rhesus*. **[The Inoculation of *Macacus rhesus* with Mouse Yellow Fever Virus.]**—*Bull. Soc. Path. Exot.* 1932. Oct. 12. Vol. 25. No. 8. pp. 866–869.

A monkey inoculated intracerebrally with mouse yellow fever virus, after 16 passages in mice, was killed *in extremis* on the seventh day with typical symptoms of ordinary yellow fever. A second monkey inoculated subcutaneously with a liver suspension of the first monkey, died of typical yellow fever on the 12th day. Four monkeys were inoculated with a mouse virus after 21 to 31 passages in mice, whilst another four monkeys with another strain of mouse virus after 145 to 161 passages in mice. The former was found to persist longer and more constantly in the blood of the monkeys than the latter. Mosquitoes fed on a monkey infected with a mouse strain after 21 passages in mice were fed after intervals of 17, 21 and 22 days on two monkeys which both became infected with non-fatal yellow fever. A similar experiment with virus after 147 passages in mice gave negative results.

E. H.

LLOYD (Wray) & PENNA (H. A.). **Studies on the Pathogenesis of Neurotropic Yellow Fever Virus in *Macacus rhesus*.**—*Amer. Jl. Trop. Med.* 1933. Jan. Vol. 13. No. 1. pp. 1–45. With 6 figs. [16 refs.]

An interesting study of the pathogeny in monkeys of a neurotropic strain of the virus which has been passaged by intracerebral inoculations in mice for three years with more than 200 passages.

Three monkeys inoculated intracutaneously with a suspension of infected mouse strain showed reactions at the site of inoculation and two of them developed fever. All these animals were subsequently found to be immune. Monkeys inoculated either subcutaneously or intraperitoneally frequently showed fever and were immunized against yellow fever, and often virus could be recovered from the circulation. Attempts were made by such passages in monkeys to re-establish the viscerotropic properties of the virus, but without success.

Two monkeys were inoculated into the sciatic nerve with suspensions of virulent mouse virus. Both of these animals had 5 to 6 days of fever after intervals of 17 and 22 days respectively, and were found to have been immunized. One was tested against the ordinary viscerotropic virus and the other inoculated intracerebrally with neurotropic virus but neither of them showed any reaction.

When normal monkeys were inoculated intracerebrally or intraspinally with the neurotropic virus they developed a characteristic encephalitis with definite pathological lesions, but the animals inoculated intraspinally showed longer incubation periods than those inoculated into the brain. Monkeys that had recovered or been immunized against yellow fever were unaffected by injections of the neurotropic virus. As in the case of mice, monkeys dying of yellow fever encephalitis showed the presence of virus in the brain, spinal cord and peripheral nerves, also in the retina, salivary glands and adrenals. At death the virus was absent from the blood, spinal fluid, liver, kidney, pancreas and spleen.

The pathological changes in the central nervous system were widespread infiltration of mononuclears and lymphocytes in perivascular concentrations and in diffuse disseminations throughout the central nervous system. As a rule the infiltration was most marked in the regions of the basal ganglia and brain stem. Degenerative changes occur in the neurone cells of the cerebral cortical gyri, brain stem and spinal cord.

The neurotropic strain of virus after passage in the nervous system of monkeys for seven months still retained its characteristic properties and when tested in mice was indistinguishable from the strains that had been maintained exclusively in mice.

Typical yellow fever encephalitis was also produced by the inoculation of the neurotropic virus into other species of animals including the Asiatic monkey *Macacus cynomolgus*, the African *Cercopithecus tantalus*, the South American *Saimiri sciureus* and *Ateles paniscus*, and in certain marmosets, as well as at least two rodents, the guineapig and the agouti.

A Berkefeld N filtrate of the neurotropic virus in normal saline containing 10 per cent. serum was found to be infective to monkeys, and such filtrates were found to retain their properties when dried *in vacuo* in the frozen state. *E. H.*

ROUBAUD (E.) & STEFANOPOULO (G.). Recherches sur la transmission par la voie stégomyienne du virus neurotrope murin de la fièvre jaune. [**Studies on the Mosquito Transmission of Neurotropic Yellow Fever Virus.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 305–309.

An independent confirmation of the fact that neurotropic yellow fever virus after numerous passages in mice is not easily transmitted by mosquitoes. However, the presence of virus for several days in the circulation of inoculated animals shows that great care is essential in using this virus for the vaccination of human beings. *E. H.*

DAVIS (Nelson C.), LLOYD (Wray) & FROBISHER (Martin), Jr. **The Transmission of Neurotropic Yellow Fever Virus by Stegomyia Mosquitoes.**—*Jl. Experim. Med.* 1932. Dec. 1. Vol. 56. No. 6. pp. 853–865.

Using the French strain of neurotropic virus in mouse passages from the 149th to the 181st, the authors infected both rhesus monkeys and mice in order to determine whether it was possible to transmit the virus through mosquitoes.

The insects were allowed to feed on monkeys 24 to 48 hours after the inoculation and mice after intervals of 2 to 24 hours. Although circulating virus was present in every animal when bitten by the mosquitoes, only rarely did these insects produce infection when subsequently fed on normal monkeys or mice. Mosquitoes that had acquired their infection by feeding on an infected monkey were fed on

6 mice 2 weeks old, and three became ill with encephalitic symptoms and were shown to contain the neurotropic virus. It is evident, however, that this fixed neurotropic strain cannot be maintained in mosquitoes as well as can the viscerotropic strains. Even after passage through mosquitoes there was no evidence of the reversion of the neurotropic virus to the original type and it is evident that the virus has changed fundamentally as a result of its passages in mice. *E. H.*

MATHIS (Maurice). Sur le pouvoir infectant des *Macacus rhesus* vaccinés contre la fièvre jaune. [**The Infective Capacity of** *Macacus rhesus* **Vaccinated against Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 310–313.

Monkeys inoculated subcutaneously or intraperitoneally with neurotropic virus, after 140 passages in mice, were found to contain virus in the circulating blood from 19 hours after inoculation up to 12 days. Attempts to infect *Aëdes aegypti* by feeding on these monkeys gave negative results. *E. H.*

CRUZ (J. da Costa) & VILLELA (Gilberto G.). L'alexine et le fibrinogène dans l'intoxication chloroformique et dans la fièvre jaune. [**Complement and Fibrinogen in Chloroform Intoxication and in Yellow Fever.**]—*C. R. Soc. Biol.* 1933. Mar. 10. Vol. 112. No 9. pp. 915–917.

The authors find that chloroform intoxication differs from yellow fever in its relative effect on the complement and fibrinogen content. In the former a reduction of the complement to a seventh or eighth of its original concentration was accompanied by a reduction of the fibrinogen to about one-tenth. In the case of a monkey infected with yellow fever the complement fell to about one-fifth, and the fibrinogen content only to about half the original concentration. It is concluded that the fall in the amount of complement in cases of yellow fever is not due simply to liver insufficiency, but also to a fixation of the complement *in vivo* by a complex antigen antibody. *E. H.*

WAKEMAN (A. Maurice) & MORRELL (Clare A.). **Chemistry and Metabolism in Experimental Yellow Fever in** *Macacus rhesus* **Monkeys. VI. The Bromsulphalein Liver Function Test and the Van den Bergh Reaction.**—*Arch. Intern. Med.* 1932. Dec. Vol. 50. No. 6. pp. 876–883. With 2 charts. [10 refs.]

The authors find that the rate of excretion of bromsulphalein dye by the liver is greatly diminished in yellow fever, an abnormal retention of the dye often occurring several days before death. The onset of jaundice is manifested by an increase in the bilirubin content of the blood and increased retention of bile pigment may begin several days before death.

The increasing amounts of bile pigments in the blood and the abnormally slow removal of bromsulphalein dye from the blood are the first indications of the loss of hepatic function in infected monkeys. There is usually an increased clotting time associated with a lowered fibrinogen content of the blood. Acetone is not excreted by monkeys dying of yellow fever, a fact which supports the view that the liver is the chief site of acetone formation.

[No reference is made to KERR's observations on the use of the bromsulphalein test and icterus index in yellow fever (see this *Bulletin*, Vol. 28, p. 722).] *E. H.*

HAAGEN (E.). Weitere Untersuchungen ueber das Verhalten des Gelbfiebervirus in der Gewebekultur. [**Further Studies on the Persistence of Yellow Fever Virus in Tissue Culture.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Mar. 31. Vol. 128. No. 1/2. pp. 13–21.

The author has continued to maintain the virus of yellow fever in tissue culture [this *Bulletin*, Vol. 29, p. 577] and gives details of experiments showing that after more than 100 passages there are no appreciable changes in the properties of the virus. In spite of various attempts it was found impossible to grow the virus in the absence of living cells. The virus was found to be rapidly neutralized by the action of immune serum in the presence of living cells, but when the virus had become intracellular, it was able to withstand the action even of concentrated immune serum without being affected. *E. H.*

POSTMUS (S.). De leucocytenformule bij gele koorts. [**The Leucocyte Formula in Yellow Fever.**]—*Nederl. Tijdschr. v. Geneesk.* 1933. Apr. 1. Vol. 77. No. 13. pp. 1391–1396. With 3 figs. English summary.

Rhesus monkeys infected with yellow fever were found to show two types of changes in the leucocyte curve.

(1) In fatal cases, there was an increase in the number of polynuclear neutrophile leucocytes, and a decrease in the number of lymphocytes ; the eosinophiles disappeared after the fourth day of illness and did not reappear.

(2) In cases which recovered the reverse changes took place, the polynuclear leucocytes showing a steady decrease. Other groups of leucocytes showed less distinct variations, but the eosinophiles did not disappear. If human cases show similar changes these results may furnish an explanation of the conflicting reports on the blood changes in yellow fever. *E. H.*

ARAGÃO (Henrique de Beaurepaire). Vaccinações contra a febre amarella. [**Vaccination against Yellow Fever.**]—*Brasil-Medico.* 1933. Feb. 4. Vol. 47. No. 5. pp. 75–80.

A fresh method of vaccination against yellow fever is described. Before presenting in detail the results of his own experiments in 5 individuals the author refers to the four methods of vaccination hitherto employed : 1. Injection of 2–4 cc. of the serum of man or rhesus immune to yellow fever, followed 24 hours later by 0·1 cc. of virulent blood from an infected rhesus (Aragão). 2. Inoculation of a mixture of immune human or animal serum and yellow fever virus, the blood of an infected rhesus (Aragão, HINDLE and FINDLAY). 3. Injection of human immune serum followed after an interval by a mixture of serum and cerebral virus of the camondongo (Brazilian house-rat), in the proportion of 0·3 cc. serum per kilo. body weight and 0·003 cc. of virus per kilo. (SAWYER, KITCHEN & LLOYD). 4. Injection of cerebral virus of the camondongo, pure without attenuation or previous treatment with anti-yellow fever serum. Immunization was produced in rabbit, goat, calf and is proceeding in sheep and horse, by injection of increasing amounts of virulent blood.

The author next records in detail five persons, one man and four women, who were treated with camondongo cerebral virus after a test to show that their serum prior to injection possessed no protective property against yellow fever.

The first, a woman of 45 years, received 0·001 gm. of the fresh virus with 4 cc. of the serum of persons who had had yellow fever in 1928 and 1929. Blood taken from her a week later was found infective for camondongos, but after a month was protective for rhesus. The second person, a woman of 20 years, was treated in the same way and she gave the same results except that the systemic reaction to the injection, present in the former was absent. The procedure was slightly modified in the case of the third, a woman of 35 years, with a view to minimizing reaction. She was given 3 cc. of the mixed sera of 4 persons immune to yellow fever, and 6 hours later 2 cc. of the same serum together with 0·001 gm. of virulent camondongo brain. The highest temperature thereafter was 37·4°C. except once on the third day when it reached 38·6° with an attack of vomiting. A month later 2 cc. of her blood protected a rhesus against 0·001 cc. of virulent rhesus blood. The effect of revaccination was observed in this patient by inoculating 0·001 gm. of the camondongo virus two months after the former. There was no reaction produced although the pure virus was inoculated. Patient 4, a woman of 45 years, was inoculated by the same method as the last; a month afterwards her serum in a dose of 2–4 cc. failed to protect a rhesus, but 6 cc. was effectual, the immunization was less strong. She was then revaccinated in the same way as the primary vaccination of No. 1 and a month later 2 cc. of her serum protected a rhesus against a dose of 0·001 cc. virulent blood. The fifth, a man of 36 years, was treated in the same way as No. 4 and his serum 6 weeks later protected a rhesus when injected in a dose of 2 cc.

To epitomize: The author has recorded a simple but efficacious method of vaccinating prophylactically against yellow fever, without the danger incurred from the use of pure virus and without producing systematic febrile reaction, by injecting intramuscularly into the deltoid 3 cc. of the mixed serum of four persons recovered from the disease and 6 hours later inoculating subcutaneously 2 cc. of the same serum together with 0·001 gm. of the fresh virulent brain of a camondongo. If the larger animals are satisfactorily immunized the use of serum of human recovered cases can be replaced by that of these animals. *H. H. S.*

SCOTT (R. R.). **The Yellow Fever Problem as it Affects Tanganyika Territory; together with Notes on Recent Literature on Yellow Fever.** —*East African Med. Jl.* 1933. Jan. Vol. 9. No. 10. pp. 283–293. [17 refs.]

A general account of the subject with special reference to the possibility of yellow fever being introduced into Tanganyika. *E. H.*

MOULINIER (M. R.). La fièvre jaune, proche danger. [**The Imminent Danger of Yellow Fever.**]—*Jl. Méd. de Bordeaux.* 1933. Mar. 31. Vol. 110. No. 9. pp. 251–253. With 1 map.

A paper calling attention to the spread of yellow fever in recent times, and the ways in which modern methods of communication favour the spread of the disease. *E. H.*

Sellards (A. W.) & **Laigret** (J.). Immunisation de l'homme contre la fièvre jaune par l'inoculation du *virus de souris*. **[The Immunization of Man against Yellow Fever by the Inoculation of Mouse Virus.]**—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 229–238.

A more detailed account of the method of protection against yellow fever previously recommended by the authors [see this *Bulletin*, Vol. 29, p. 572].

E. H.

Bulletin Office International d'Hygiène Publique. 1933. Jan. Vol 25. No. 1. pp. 46–64. [28 refs.] Connaissances récemment acquises sur la fièvre jaune. (Rapport de la Commission de la Fièvre Jaune de l'Office International d'Hygiène publique, présenté au Comité permanent par le Colonel S. P. James.)

The English version of this paper will be found at pp. 265-277 of No. 5 of this *Bulletin*. *A. G. B.*

ERRATUM.

No. 1, page 4, KERR summary. The words " after an extrinsic incubation period of 12 to 18 days " should be deleted.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

ATKEY (O. P. H.). La fièvre récurrente au Soudan pendant l'année 1931. **[Relapsing Fever in the Sudan during 1931.]**—*Bull. Office Internat. d'Hyg. Publique.* 1932. Nov. Vol. 24. No. 11. pp. 1861–1864.

Epidemics of this disease have continued in the provinces of the Blue Nile and Khartoum, and also there were two small epidemics in Darfur attributed to immigrants from French territory. There was a total of 492 cases with 66 deaths, compared with 386 cases the previous year. The blood of the patients was examined for spirochaetes every other day but only 35 per cent. were positive.

The use of antimony tartrate for treatment has been abandoned, and the author found that the intramuscular injection of 1 cc. grey oil gave slightly better results than the use of novarsenobillon. [See also this *Bulletin,* Vol. 29, p. 805.] *E. Hindle.*

MAURICE (G. K.). **The Entry of Relapsing Fever into the Sudan.**—*Sudan Notes & Records.* 1932. Vol. 15. Pt. 1. pp. 97–118. With 7 figs. on 4 plates.

A general account of the author's personal experiences during the great epidemic of louse-borne relapsing fever in Darfur in 1926. This epidemic killed nearly a quarter of the Fur population of the Sudan, and the economic and political results of the outbreak are described from the point of view of a medical officer who was concerned with the detection of the disease and carried out observations during the subsequent six months. *E. H.*

ROBERTSON (R. Cecil). **Relapsing Fever in Shanghai (First Report).**—*Chinese Med. Jl.* 1932. Sept. Vol. 46. No. 9. pp. 853–885. With 3 charts & 7 figs. on 4 plates. [18 refs.]

A general discussion of relapsing fever in China, with special reference to Shanghai. The number of cases admitted to the Lester Chinese Hospital, Shanghai, during the past four years has been respectively 31, 56, 50 and 234, the latter being the figure for only part of 1932. The majority of the cases occurred in the months April to July.

Interesting particulars are given on the epidemiology of the disease with special reference to predisposing causes, and it is shown that the prevalence of relapsing fever in endemic areas could be readily controlled by the application of existing Public Health knowledge. The clinical symptoms resemble those of the European strain of *S. recurrentis,* and the prognosis is good, except in undernourished patients. Intravenous injections of novarsenobillon in doses of 0·007 gm. per kilo body weight were found to cause disappearance of the spirochaetes and there were no relapses if the drug was given on the third day of fever and before the crisis. If given before the third day or when the temperature was falling relapses often occurred. Stovarsol was also used with success in a few cases.

Careful laboratory investigations of the spirochaete are recorded. The organism was successfully cultivated in various nutrient media, the best results being obtained with human serum containing 0·1 cc. of glucose Ringer's solution to each 1 cc. of serum, covered with a layer of liquid paraffin and the tubes kept at room temperature.

All the patients were infested with lice, and 15 per cent. of these lice were found to contain spirochaetes which reproduced the infection in mice. Various serological and immunological observations are recorded and by the use of the adhesion test it is hoped to be able to differentiate the strains of spirochaetes.

Particulars are given of a seven-day-old child which died with a very heavy infection of relapsing fever. The mother was infected at the time of birth and from the evidence there seems to be little doubt that in this instance the infection occurred *in utero*. *E. H.*

DUNN (Lawrence H.) & CLARK (Herbert C.). **Notes on Relapsing Fever in Panama with Special Reference to Animal Hosts.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 201–209.

A general account of human relapsing fever in Panama, which has been known to be endemic since 1905, when it was first recorded from this locality.

Since only 117 cases have been diagnosed in the Canal Zone hospitals during the years 1905 to 1930 inclusive, these figures must be only a small fraction of the total number of cases in the country for they represent only Panama Canal employees and their families, or those able to pay for treatment in these hospitals. The disease is known to be endemic in the adjoining country of Colombia and in both countries *Ornithodorus venezuelensis* and *O. talaje* are prevalent and have been shown to be efficient carriers. Both these ticks are commonly collected from rats and other mammals, and in the routine examination of these animals naturally acquired spirochaetal infections have been found which seem to be identical with the human infection. The animals in question are marmoset monkeys (*Leontocebus geoffroyi* Pucheran), opossums (*Didelphis marsupialis etensis* Allen), armadillos (*Dasypus novemcinctus fenestratus* Peters), calves and a horse.

The infection in monkeys has been successfully transmitted to man, white rats, white mice and various species of monkeys [see this *Bulletin*, Vol. 29, p. 208]. Out of 61 opossums many were infested with larvae of *Ornithodorus talaje* and six showed spirochaetes in the blood, which were readily transmissible to marmosets, white rats and white mice. Two out of 31 banded armadillos were naturally infected and two others inoculated with the human strain were readily infected, one of them dying nine days later. Two out of six calves about a month old also showed spirochaetes which were transferred to a marmoset, monkey and white rats. Spirochaetes were also found in the blood of a horse. It would seem, therefore, that the mammals occurring in Panama may serve as a reservoir for the tick borne variety of human relapsing fever. *E. H.*

PORTER (Giles S.), BECK (Dorthy) & STEVENS (I. M.). **Relapsing Fever in California.**—*Amer. Jl. Public Health.* 1932. Nov. Vol. 22. No. 11. pp. 1136–1140.

A useful summary of the 30 cases of relapsing fever recorded up to date (August, 1932) from the State of California.

Evidence is presented showing that wild rodents may harbour the spirochaetes, for the inoculation of their blood into white mice has resulted in obtaining the infection from nine chipmunks and two squirrels. Whether the rodents act as a reservoir, or merely become infected from the ectoparasite which also transmits the infection to man, has not yet been determined. *E. H.*

RUSSELL (Helen). **The Pathology of the Spleen in Relapsing Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 259–265. With 5 figs. (2 coloured) on 2 plates. [21 refs.]

A useful summary of the pathological changes in the spleen histology of 15 fatal cases of relapsing fever collected in the Gold Coast between 1929 and 1931.

The most important and characteristic change was found to be the occurrence of miliary lesions consisting of a zone of congestion and cell infiltration round the malpighian bodies. These miliary lesions are quite distinct in sections stained with haematoxylin and eosin. When sections were stained by silver methods the spirochaetes were often detected breaking up in these lesions after they had disappeared from the circulation.

The author concludes with a historical survey of the subject and it is pointed out that the miliary lesions of the spleen occurring in the Gold Coast cases correspond with those described by GRIESINGER in 1857 in Egypt in fatal cases of " bilious typhoid " fever, which he believed was a form of relapsing fever. *E. H.*

ROTHERMUNDT (M.) & WICHMANN (F. W.). Studien ueber die chemotherapeutische Beeinflussbarkeit verschiedener Rekurrensspirochäten (*Spirochaeta crocidurae, Spirochaeta hispanica* und *Spirochaeta duttoni*) bei infizierten weissen Mäusen. [**Studies on the Chemotherapeutic Treatment of Various Relapsing Fever Spirochaetes** (*S. crocidurae, S. hispanica* **and** *S. duttoni*) **in Infected White Mice.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 77. No. 1/2. pp. 1–12. [10 refs.]

The authors tested the effect of a number of chemotherapeutic substances including arsenic, antimony, bismuth and gold compounds, on mice, infected with three varieties of relapsing fever spirochaetes.

In one series of experiments the blood of the treated mice was examined for six weeks and then the brains tested for any residual infections. In the other series the infected mice were only examined the day following the injection to see whether the spirochaetes had disappeared or not. With all three spirochaetes it was found that very high doses, approaching the *dosis tolerata,* were required in order to cure brain infections and, as shown by a table, even a large proportion of normal mice died after such doses. Even when the brain is negative this may be the result of natural recovery, which is apt to vary with the same strain, for in the past two to four years the percentages of mice showing residual brain infections has fallen from 100 to 22 per cent. in the case of *S. crocidurae,* from 58 to 20 per cent. in *S. hispanica,* and from 100 to 30 per cent. in *S. duttoni.* Consequently it is necessary to employ a large number of animals in using this method of estimating the value of any chemotherapeutic agent. The results of the authors' experiments show that all three infections are equally difficult to cure as judged by the results of examination of the blood or brain. As a general rule, however, *S. duttoni* was more susceptible to arsenobenzol derivatives and less susceptible to gold compounds than *S. hispanica* and *S. crociduræ*, which gave better results with gold compounds than with the arsenobenzol derivatives.

In all three infections the doses required were so high as to approach the *dosis toxica* and consequently no satisfactory chemotherapeutic index could be obtained. In tests comparing the efficiency of compounds in the treatment of spirochaetal infections it is recommended that strains should be used in which the curative dose does not approach too closely to the *dosis tolerata*. E. H.

DUBOIS (A.). Le traitement par le solganal B en suspension huileuse de l'infection à Sp. duttoni de la souris. [**The Treatment of** *S. duttoni* **in Mice with Oily Suspensions of Solganal B.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 429–431.

Seven mice infected with *S. duttoni* each received an injection of 0·005 gm. oleo-solganal, an oily suspension of solganal B. Six of these animals were completely sterilized, including the brains of three of them, and one relapsed. These results suggest that this compound has an activity comparable with solganal B, and is superior in its therapeutic action in this infection to the common trivalent and pentavalent organic arsenical compounds, especially in its action on residual brain infections [see this *Bulletin*, Vol. 29, p. 563]. E. H.

HASSKÓ (A.). Ueber die therapeutische Wirkung von Arsinsäuren und Arsenoverbindungen der Pyridinreihe bei Spirochäteninfektionen. I. Mitteilung: Heilversuche bei der experimentellen Recurrensinfektion (*Spirochaeta crocidurae*) der Maus. [**The Therapeutic Action of Trivalent and Pentavalent Arsenic Compounds of the Pyridin Series on Spirochaetal Infections. Part I. The Treatment of Experimental Relapsing Fever** (*S. crocidurae*) **in Mice.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Jan. 30. Vol. 127. No. 4/6. pp. 299–306. [20 refs.]

A table is given showing the therapeutic action of 15 trivalent and 5 pentavalent arsenic compounds belonging to the pyridine series, and one arsenic strychnine compound, on mice infected with the *crocidurae* strain of *S. duttoni*. A number of compounds caused the temporary disappearance of spirochaetes from the blood but only one of them gave results comparable with neosalvarsan treatment. This compound BR 34, the di-sodium salt of 2-pyridone-5-arseno-1′ (3′-amino-4′-oxybenzol) had a *dosis tolerata* of 0·005 gm. subcutaneous and 0·002 gm. intravenous per 20 gm. mouse, the *dosis curativa* being 0·001 intravenous. Although the spirochaetes disappeared from the blood and did not relapse, the infection persisted in the brains of the treated mice, as in the case of mice treated with neosalvarsan. E. H.

RUSSELL (Helen). **Experimental Relapsing Fever, Accra, 1931.**—*West African Med. Jl.* 1933. Jan. Vol. 6. No. 3. pp. 36–43. With 2 charts. [16 refs.]

The author has made a detailed study of a strain of relapsing fever isolated from a patient in the African Hospital in Accra.

The strain was maintained in the large rat *Cricetomys gambianus* which proved a very convenient host, in which the infection followed the same course as in monkeys and squirrels. As a rule this strain only produced one attack, but eventually it relapsed and the spirochaetes of the relapse were found to be serologically distinct. When *gambianus* rats infected with this type relapsed, the spirochaetes of the relapse reverted to the original type, there being the usual alternation of two distinct types. It is pointed out that when isolating a strain of the relapse type, results obtained with the first passage animals should be discounted, since in addition to inoculating spirochaetes of the relapse one also inoculates immune bodies against the original type of spirochaetes, and the passive immunity thereby induced is liable to influence the type of spirochaete with which the animal is expected to relapse.

The two types called respectively A and B remained unaltered after passages in *C. gambianus* for many months. In one individual another type (C) appeared on a second relapse, and in addition a fourth distinct type, from which it is concluded that relapsing fever spirochaetes have the capacity of unlimited serological variation. When rats were inoculated simultaneously with spirochaetes belonging to types A and B the resulting attack comprised spirochaetes of both types which could be separated from one another by absorption with immune sera. It was found that the young of infected *C. gambianus* were immune to the type of spirochaete with which the mother was infected shortly before birth, but susceptible to other types. There was no evidence that this inherited immunity is due to infection of the young *in utero* but there was some evidence that the immunity may be acquired from the milk.

C. gambianus were successfully protected for at least six months by vaccination with a mixture of dead spirochaetes and immune serum. Animals inoculated with a Berkefeld filtrate of this mixture did not develop immunity, showing that the antigenic substance was present in the spirochaetes. The immunity to types A and B of the relapsing fever spirochaete seems to be lifelong in *C. gambianus*, for animals were still immune two years after infection; moreover, removal of the spleen did not seem to have much effect on this active immunity.

Two cases of laboratory infections occurred and both responded to N.A.B. treatment given at the height of the fever. One was infected with the C type spirochaete and two and a half yearslater his serum lysed C type spirochaetes in a 1 : 2 dilution and caused agglutination in a 1 : 320 dilution but had no effect on types A and B. The second boy had a type A infection and a month later his serum lysed A spirochaetes in a 1 : 640 dilution and showed clumping beyond 1 : 5,000; it had no effect on types B and C spirochaetes.

Several attempts were made without success to pass living spirochaetes through a Berkefeld N filter. [The author only used pressures of 15 lbs., which other observers have found insufficient to cause the filtration of relapsing fever spirochaetes. TODD and WOLBACH (see this *Bulletin*, Vol. 3, p. 404) used a pressure of 50 lbs.] *E. H.*

BEUNDERS (B. J. W.) & VAN THIEL (P. H.). Untersuchungen ueber die Persistenz von *Spirochaeta duttoni* in Mäusegehirnen bei experimenteller Febris recurrens [**Studies on the Persistence of** *S. duttoni* **in the Brains of Infected Mice.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Nov. 29. Vol. 114. No. 3. pp. 568–583. With 2 figs. [32 refs.]

Using the Hamburg (1906) strain of *Spirochaeta duttoni* in mice, the authors found that a persistent brain infection was almost a constant feature, no matter which method of inoculation had been used. The brains of the mice were found to be infective up to 409 days after the original infection, and out of 28 immune mice only two were non-infective (both after an interval of 385 days); therefore this seems to be a characteristic feature of the strain. These results contrast with those of DICKINSON, who in 1932, working with same strain in mice, found persistent brain infections in only one-third of the animals.

With regard to the possibility of an ultra-microscopic stage of the spirochaetes, although this is not excluded, the authors incline to the view that spirochaetes, as such, persist in the brain for the following reasons :—

(*a*) When heated to a temperature of 44°–45°C., which kills the spirochaetes in 30 minutes, the brains of recovered mice lost their virulence at the same temperature as that which killed the spirochaetes in the blood.

(*b*) Spirochaetes are easily overlooked in microscopic examination, especially when rare. Moreover, since it is possible to infect mice by the injection of single organisms and the incubation periods following such inoculations closely approximate those following the injection of infected brain material, it is considered likely that only very few spirochaetes persist in the brain.

(*c*) Spirochaetes were found in sections of the brains of immune mice, stained by Steiner's silver method, and their apparent absence in other silver preparations is attributed partly to their rarity and also to the uncertainty of the staining method. *E. H.*

DELANOË (P.). Une observation d'infection naturelle du chacal due au spirochète marocain, *Sp. hispanicum* variété *marocanum* Nicolle et Anderson 1928, particulièrement longue. [**Natural Infection of the Jackal with** *S. hispanica* **var.** *marocana* **of Particularly Long Duration.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 944–946.

A young wild jackal [presumably caught in the neighbourhood of Mazagan, Morocco] was inoculated with trypanosomes and 24 days later showed spirochaetes in the blood. Groups of 4 guineapigs each inoculated with 2·5 cc. of the blood of this jackal on the 36th and 41st days of the infection all remained negative whilst a group inoculated on the 47th day all became infected. After reinoculation with the blood of one of these guineapigs the jackal's blood was infective up to the 73rd day after the original infection. *E. H.*

KRANTZ (Walther). Ueber die Heilwirkung des Immunserums beim experimentellen Recurrens. [**The Action of Immune Serum in Experimental Relapsing Fever.**]—*Arch. f. Dermat. u. Syph.* 1932. Nov. 21. Vol. 167. No. 1. pp. 136–140.

The serum of a mouse that had recovered 6 weeks previously from an infection with the relapse strain of *S. recurrentis*, was heated to 56°C. for 30 minutes and then mixed with living spirochaetes of the same strain. The resulting mixture was inoculated into mice with negative results. After 30 days these mice were inoculated with the same strain of spirochaetes and all behaved like normal mice.

A series of five mice injected with a mixture of immune serum and spirochaetes kept together for one week, also failed to show any infection with the exception of one individual which was positive for one day. When inoculated with spirochaetes five weeks later this individual remained negative, one other showed a slight infection and the other three heavy infections. The injection of immune serum at the crisis of the infection not only had no curative effect but seemed if anything to be harmful, for the injected mice died, whilst the untreated ones very rarely died during the first attack. Injections after the crisis had no effect on the course of the infection.

It would seem that only the normal host is capable of responding to an injection of immune serum and spirochaetes in such a way as to protect the animal against infection but even in this case no protection is conferred against subsequent infections. *E. H.*

YUAN-PO (Li). **A New Method for the Cultivation of** ***Spirochaeta recurrentis.***—*Kitasato Arch. Experim. Med.* 1933. Jan. Vol. 10. No. 1. pp. 78–86. With 1 plate.

Three strains of *Spirochaeta recurrentis* in Shanghai have been cultivated in a special medium, and kept *in vitro* for 13, 14 and 38 generations without losing their virulence for mice. The culture medium is prepared as follows :—

1 cc. of sterile white of an egg is placed in a test tube and heated to 80–85°C. for about 30 minutes. The white of one egg is sufficient for 15 tubes. The yolk of the egg is placed in a flask containing 400 cc. of sterile 0·8 per cent. saline and thoroughly shaken. The contents of the flask are then allowed to settle for some days in the ice chest. The pH of the supernatant liquid is about 7·0 and it keeps its properties for at least two months. About 5 cc. of this liquid is added to each tube of heated egg white and the resulting medium either used at once or first heated to 55°C. for half an hour. The eggs must be fresh and those whose shells are a dark biscuit colour produce the most favourable culture medium.

One or two drops of citrated infected blood are added to each tube and the medium then covered with sterile paraffin oil and kept at 35–36·5°C. Subcultures are made every 3–5 days by transplanting about 0-5 cc. of a good culture together with a small drop of citrated human or rabbit blood, then covering with paraffin and incubating. The citrated blood is prepared by mixing 2 cc. of blood with 0·2 cc. of a 10 per cent. sodium citrate solution also containing 10 per cent. glucose. The citrated blood keeps for at least 3 weeks if kept in the ice chest.

Some notes are added on the morphology of the spirochaetes observed in the cultures [but the two terminal filaments with small round corpuscles at each end described by the author, and also the figures of them, are very suggestive of degeneration products or artefacts].

E. H.

STYLIANOPOULOS (M.). Transmission expérimentale de la spirochétose des poules au pigeon et au lapin. Persistance du virus dans le cerveau de ces animaux. [**Experimental Transmission of Fowl Spirochaete to Pigeon and Rabbit. Persistence of the Virus in their Brains.**]—*C. R. Soc. Biol.* 1933. Feb. 10. Vol. 112. No. 5. pp. 421–423.

Working in Greece the author found that pigeons of 4 to 5 months, collected from houses free from *Argas reflexus*, the local carrier, when inoculated with the blood of fowls suffering from fowl spirochaetosis invariably became infected, showing fever with the presence of spirochaetes in the circulation. When subinoculated into other pigeons the spirochaetes seemed to have increased in virulence, as 50 per cent.

of the birds succumbed to the infection. Although successive passages in pigeons seemed to increase the virulence for these birds, there was no diminution in its pathogenicity in fowls. The virus was found to persist in the brains of recovered pigeons, in one experiment eight days after the spirochaetes had disappeared from the blood.

Rabbits inoculated intraperitoneally with fowl spirochaetes showed rare parasites in the blood 12–24 hours later which only persisted for about 48 hours. If the spirochaetes were inoculated into the testis, there was a strong local reaction reaching its maximum after 3 to 5 days, and exudate collected from the scrotal sac contained numerous spirochaetes. The brains of recovered rabbits were found to be infective 12 days after spirochaetes had disappeared from other parts of the body. Passage through rabbits had no effect on the virulence of the organism towards fowls. *E. H.*

MATTEI. La febbre ricorrente nella Somalia Italiana.—*Ann. di Med. Nav. e Colon.* 1933. Jan.–Feb. 39th Year. Vol. 1. No. 1–2. pp. 49–75. With 5 charts on 2 plates. [15 refs.]

MOCHTAR (A.). Spirillum cardiopyrogenes.—*Geneesk Tijdschr. v. Nederl.-Indië.* 1932. Dec. 20. Vol. 72. No. 26. pp. 1754–1758.

PATERSON (J. L. H.). A Case of Relapsing Fever with Extreme Anaemia.—*Chinese Med. Jl.* 1932. Sept. Vol. 46. No 9. pp. 905–907.

RAT-BITE FEVER.

AKASAWA (S.). i. Studien ueber die Arzneifestigkeit bei Rattenbisskrankheit, Erreger: *Spirochaeta morsus-muris*. II. Mitteilung: Arsenikfestigkeit. [**Studies on Drug Resistance in Rat-Bite Fever. Part 2. Arsenic Resistance.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Nov. 17. Vol. 126. No. 3/4. pp. 261–277.

——. ii. Studien ueber Arznei-Festigkeit bei Rattenbiss-Fieber-Spirochaeten: *Spirochaeta morsus-muris*. I. Wismuth-Festigkeit. **Part I. Bismuth Resistance.**]—*Kitasato Arch. Experim. Med.* 1933. Jan. Vol. 10. No. 1. pp. 57–77. [26 refs.]

i. The author has produced a strain of *Spirillum minus* resistant against neosalvarsan, which was also resistant against other arsenical preparations such as salvarsan, sulpharsenol, villon, silversalvarsan and neostibarsan. This strain has maintained its resistance for two years with 120 passages in mice, and was also resistant when inoculated into rats. When an arsenic resistant strain in mice was treated repeatedly with other therapeutic substances not containing arsenic, the arsenic resistance gradually disappeared; *e.g.*, after ten injections of 0·5 cc. neotrepol, an arsenic resistant strain changed back to the original strain.

In normal mice no difference in virulence was found between the original strain and the arsenic resistant one, but by blocking the reticulo-endothelial system it was found that the latter strain was less virulent than the normal. Compared with the original, the arsenic resistant strain was found to be more susceptible to neotrepol and other compounds not containing arsenic. An arsenic resistant strain was found to be still susceptible to germanin after 10 injections, whilst the original strain had become resistant after only 5 injections. The arsenic strain, however, was more resistant against combined therapy such as neosalvarsan and germanin, neosalvarsan and neotrepol, than the original strain.

Using parafuchsin as the first preparation and muthanol as the second, in chemotherapeutic interference tests, the mice infected with the arsenic resistant strain reacted in a dilution of 1 : 1,000 whilst mice infected with the original strain reacted in a dilution of 1 : 2,000.

The author states that the spirochaetes of the resistant strain withstand the lytic effects of saponin and taurocholic acid better than the original one.

ii. Mice infected with a strain of *Spirillum minus* were treated by injections of neotrepol and other bismuth compounds such as muthanol and casbis. Little difficulty was encountered in producing bismuth resistant strains which maintained their resistance during 50 passages in mice over a period of two years and also when passaged in rats. When a bismuth resistant strain was treated with neosalvarsan, the resistance disappeared after ten injections. Uncertain results were obtained with germanin and silversalvarsan, whilst trypaflavine and parafuchsin had no effect on the bismuth resistance. No difference in virulence was observed between the normal and drug resistant strains, except in splenectomized mice in which the latter strain was rather more virulent, and in general the properties of the bismuth resistant strain as compared with the normal, agree with those recorded above for arsenic resistant strains. *E. Hindle.*

BURBI (Livio). Spirochetosi spontanea del topo e sodoku sperimentale della cavia. [**Natural Spirochaetosis in the Rat and Experimental Rat-Bite Fever in the Guineapig.**]—*Pathologica.* 1932. Dec. 15. Vol. 24. No. 494. pp. 827–831. English summary.

The author has previously reported in *Pathologica,* 1931, Feb. 15, Vol. 23, No. 472, p. 120, a large number of successes (85 per cent.) from the subcutaneous inoculation into guineapigs of the teeth of wild rats, the animals being killed and the teeth extracted at once.

He has carried out a further series and obtained positive results, the production of rat-bite fever, in all cases with wild rats, but with a rapidly diminishing proportion when the rats were kept in captivity on diet. In one-fourth to one-third of the rats (27·7 per cent.) the blood was infective, the disease being set up by intraperitoneal injection into guineapigs. The author maintains that in *Mus decumanus* there exists a natural spirillosis which can convey sodoku to guineapigs.

H. H. S.

LEPTOSPIROSIS.

MULDER (J.). Over de vroege clinische diagnose van de, aan de ziekte van Weil verwante, sumatraansche leptospira-infecties (Spirochaetosis febrilis). [**On the Early Clinical Diagnosis of the Sumatran Leptospiral Infection Related to Weil's Disease.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. Nov. 5. Vol. 76. No. 45. pp. 5130–5135. [15 refs.] English summary.

In the leptospiroses of Sumatra, although related to Weil's disease in Europe, more than 90 per cent. of the cases do not develop jaundice and are of a benign character. The most important early clinical symptoms are hyperaemia of the eyeball (episcleral and conjunctival injection) which may be seen under the eyelids in the first days of illness. Next in importance are the muscle pains, especially in the calves of the legs.

Leucocyte cylinders may be found in the urine caused by a cellular exudation in the tubules as a result of the invasion of the kidneys by leptospira. The blood shows a normal or slightly increased leucocyte count, with marked decrease or absence of eosinophiles. Severe cases sometimes show no hyper-leucocytosis. *E. Hindle.*

Slot (Gust A.) & van der Walle (N.). Leptospirosen in Bangkinang en omgeving. [**Leptospirosis in and round Bangkinang (Sumatra).**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Nov. 8. Vol. 72. No. 23. pp. 1579–1597. With 6 charts & 1 map. [12 refs.]

At Bangkinang (Middle Sumatra) and its surroundings in 1928–1930, especially during the rainy season, several cases were seen clinically suggesting leptospirosis, mostly in Chinese tin miners. In 17 cases, either by culture, direct or indirect, or by agglutination, this diagnosis was established. With the exception of one case of *L. hebdomadis* infection, the cases were caused by *L. icterogenes* [=*icterohaemorrhagiae*]. By means of dark field examination probable leptospirae were found in water from pools. They were not found in water from the local river (Kampar kanan) or from the mining pits. The water from the pools was either neutral or acid, the river water slightly alkaline. As no leptospirae were found in local rats (*R. diardii*) and the attempts to infect guineapigs and white rats by means of water and mud from the incriminated pools only yielded negative results, the epidemiology of the disease remains obscure. *W. J. Bais.*

i. Petzetakis. L'épidémie d'Hermoupolis de Syra en août 1931 était une spirochétose ictéro-hémorragique. Origine hydrique de l'épidémie. Présence des spirochètes chez les rats d'égout en Grèce. [**The Spirochaetal Nature of the Epidemic at Hermoupolis, Syra, in August, 1931.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1933. Feb. 20. 49th Year. 3rd Ser. No. 5. pp. 201–205.

ii. ——. Nouveau cas de spirochétose ictéro-hémorragique observé à Syra en janvier 1932. Reproduction expérimentale de la maladie sur le cobaye. [**New Case of Spirochaetal Jaundice observed at Syra in January 1932.**]—*Ibid.* pp. 205–209. [13 refs.]

i. See this *Bulletin, ante*, p. 15.

ii. The record of an additional case of Weil's disease at Syra. Spirochaetes were found in the urine and a guineapig inoculated with urine collected on the 13th day of the disease died with typical symptoms of spirochaetal jaundice. *E. H.*

Petzetakis (M.). Sur la sensibilité du campagnol vis-à-vis du virus de la spirochétose ictérohémorragique. [**The Susceptibility of the Field Mouse to the Virus of Spirochaetal Jaundice.**]—*C. R. Soc. Biol.* 1933. Jan. 13. Vol. 112. No. 1. pp. 13–14.

The author inoculated field mice with the Syra strain of *S. icterohaemorrhagiae* and found that they were very susceptible. Large doses produced a fatal septicaemia and the animals died before jaundice could develop, but when smaller doses were used typical symptoms developed, including jaundice, subcutaneous haemorrhages and the general conditions shown by infected guineapigs. Spirochaetes were found in the kidneys and the infection was reproduced in guineapigs by the inoculation of tissues from these infected field mice.

E. H.

HEGLER (C.). Weilsche Krankheit als Unfallfolge. [**Weil's Disease as an Accident.**]—*Deut. Med. Woch.* 1933. Feb. 24. Vol. 59. No. 8. pp. 298–299.

During the years 1926–1932, 23 cases of Weil's disease have been admitted to the St. George's Hospital, Hamburg, mostly during the bathing season, July to September. Some of these cases must be regarded as accidental occupational infections, such as two men who worked in the drains, a dock labourer working on a dredger in the harbour, and two other cases among the crew of a ship over-run with rats. In the case of the Hamburg dock labourer, who died of the infection, it was necessary to pay compensation.

Last year there were 13 cases of Weil's disease and although the improvements in the serological diagnosis of this infection may partly account for this increase, there also seems to have been a definite rise in the incidence of the disease, and this fact should be borne in mind in considering the question of insurance against occupational liabilities. *E. H.*

MERKLEN (Pr.) & WAITZ (R.). Décharges précoces de spirochètes intracellulaires dans les urines de malades atteints de spirochétose ictéro-hémorragique. [**The Early Discharge of Intracellular Spirochaetes in the Urine of Patients infected with Spirochaetal Jaundice.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1932. Nov. 28. 48th Year. 3rd Ser. No. 29. pp. 1433–1440. With 1 fig.

A record of two cases of Weil's disease in Paris, in both of which spirochaetes were found inside cells, especially mononuclears, in the urine on the eighth day of the disease.

These intracellular spirochaetes were obviously degenerating and when inoculated into guineapigs failed to produce any infection. They were easily detected by simple microscopic examination of fresh specimens, and would seem to furnish a useful method for the early diagnosis of the disease, since they are found several days before free spirochaetes occur in the urine. *E. H.*

KRITSCHEWSKI (I. L.) & KAGAN (N. W.). Ueber das Problem der direkten und indirekten Wirkung in der Chemotherapie. IV. Ueber den Wirkungsmechanismus von Wismut auf Spirochäten. II. Mitteilung. Antwort an Uhlenhuth und Seiffert zu ihren "Bemerkungen zu dem Aufsatz von Kritschewski." Zbl. Bakter. I. Orig. Bd. 118. [**The Problem of Direct and Indirect Action in Chemotherapy. IV. The Mode of Action of Bismuth on Spirochaetes. Part 2.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Dec. 23. Vol. 126. No. 7/8. pp. 568–580.

A polemical article in which the authors give records of additional experiments on guineapigs infected with spirochaetal jaundice, treated in various ways by injections of bismuth yatren A. The authors' conclusions are that in this disease the bismuth compounds act directly on the spirochaetes and kill them without antibodies taking any part in the process. [See this *Bulletin*, Vol. 28, p. 304.] *E. H.*

THIRY (U.) & TIELLIU (G.). La spirochétose ictérohémorragique chez la souris blanche. [**Spirochaetal Jaundice in White Mice.**]—*C. R. Soc. Biol.* 1933. Jan. 20. Vol. 112. No. 2. pp. 221–224.

Five lots each of 25 white mice were inoculated subcutaneously with five different strains of *S. icterohaemorrhagiae* pathogenic to guineapigs. In every case the mice became infected, but with three of the strains no clinical symptoms developed, but spirochaetes appeared in the urine after 15 to 30 days and continued there indefinitely. Moreover this urine reproduced the disease in guineapigs.

With another strain the mice became ill on the tenth day and all developed a slight jaundice which lasted two or three days. Three mice died on the 11th day and one on the 12th and ten more in the next two months. All the remaining ones showed spirochaetes in the urine. The infection was transmitted from mouse to guineapig, and guineapig to mouse through four alternating passages. In the case of the fifth strain of *S. icterohaemorrhagiae* the mice became jaundiced after 8 days and five died on this and the following days. The jaundice disappeared after 4 days but 16 more mice died in the next few weeks, and those remaining alive were found to be carriers. Passages from mouse to guineapig and *vice versa* were successful, the urine of an infected mouse producing a fatal infection in the guineapig.

It is evident, therefore, that white mice can be used for the detection of variations in virulence which cannot be recognized in guineapigs.

E. H.

SARDJITO (M.). Umwandlung von antigenen Eigenschaften und zugleich Avirulentwerden eines Rattenleptospirastammes durch Züchtung im Wasser. [**Changes in the Antigenic Properties together with Loss in Virulence of Rat Leptospira Strains by culturing in Water.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Dec. 15. Vol. 126. No. 5/6. pp. 395–403.

The author has attacked the problem of the relationship of pathogenic strains of leptospira with the common water leptospira, from a somewhat fresh angle and has reached the conclusion that one may change into the other.

The urine of an infected rat, containing pathogenic leptospira, was mixed with sterile Berlin tap water and 2 to 5 days later this material was used for subcultures in various kinds of sterile tap water. Out of 12 kinds of water one from Leiden having a pH of 7·4 was found to give the best growths of leptospira, which grew in company with various contaminating organisms derived from the rat's urine. After five months a pure culture of leptospira was isolated from the water and compared with the original strain. The antiserum against the original rat strain agglutinated the leptospira of the same strain in dilutions of 1 : 12,800, whilst the same antiserum agglutinated the leptospira after water culture only in a dilution of 1 : 100. An antiserum prepared against this water culture strain agglutinated these organisms in a dilution of 1 : 6,400, but had no effect on various pathogenic leptospira including 2 human and 2 rat strains. Moreover, after water culture the rat leptospira had lost its virulence for guineapigs, and in addition was unaffected by oligodynamic factors such as the presence of various metals in the culture media, which are fatal to pathogenic strains.

Cultures made direct from the kidney of a rat infected with the original strain gave no support to the hypothesis that water leptospira might have been mixed with the pathogenic organisms in the kidney, for the resulting cultures contained only organisms of the Weil type.

Consequently the author is of the opinion that the pathogenic leptospira of the rat's kidney can change into the non-pathogenic water type, and therefore one must accept the view that under certain conditions the reverse process may take place and the water leptospira change into the pathogenic type. *E. H.*

VAN THIEL (P. H.). Die Umwandlung von Leptospira pseudoicterogenes, Stamm Leiden. [**Changes in the Leiden Strain of** ***Leptospira pseudoicterogenes.***]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Jan. 30. Vol. 127. No. 4/6. pp. 290–298. [26 refs.]

The author has isolated nine strains of *S. biflexa* from various samples of Leiden water in addition to the well-known strain Leiden I. Strains 1 and 4, 5 and 6, 2 and 7, 8 and 9 are identical or very closely related. Strain 3 is related to strains 1 to 7. Strains 8, 9 and 10, are quite distinct from the others. None of the strains are in any way related to the pathogenic Weil strains.

It is of interest that the water strain Leiden I received back from ZUELZER, and also Leiden I supplied by SCHÜFFNER, were quite different from the original strain, Leiden I, kept by the author. Antiserum which agglutinated the latter strain in a dilution of 1 : 10,000 agglutinated Zuelzer's Leiden I only in a dilution of 1 : 100. A water strain after passage through a guineapig, received from ZUELZER, and also a typical Weil strain were also agglutinated only in a dilution of 1 : 10.

As a result of further tests it would seem that both Zuelzer and Schüffner's strains of Leiden I are identical, but differ from the original Leiden I. It seems that this strain must have changed shortly after being received by SCHÜFFNER at Amsterdam, probably under the influence of other culture media.

The author attempted without success to infect guineapigs with strains 2 to 10 of the Leiden water leptospira and also with Zuelzer's strain 2, and is of the opinion that *S. biflexa* (*Leptospira pseudoicterogenes*) is quite distinct from the pathogenic strains. In view of the negative results obtained in attempting to infect guineapigs with these water strains the author considers that it is almost hopeless to continue experiments on the problem of their changing into pathogenic forms.

E. H.

DINGER (J. E.). Duurzaamheid der smetkracht van leptospirenkweeken. [**Duration of Virulence of Leptospira Strains.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Oct. 25. Vol. 72. No. 22. pp. 1511–1519. With 1 plate.

The virulence of pathogenic leptospira strains is maintained for a longer period in NOGUCHI's semisolid agar medium than in VERVOORT's liquid medium. In the former the leptospirae make a strongly refractive disc constituted by a viscous mass in which the leptospirae are present in extraordinary numbers. This disc is situated at the level of the minimum oxygen tension. The author offers a theory giving an explanation of this curious observation. *W. J. Bais.*

TROPICAL OPHTHALMOLOGY.

A REVIEW OF RECENT ARTICLES. XIX.*

Trachoma.—THYGESON[1] has reported some of the results of his experiments in inoculating *Macacus rhesus* monkeys with the micro-organism described by NOGUCHI. Recent cultures of the bacterium obtained from human trachoma induced granular conjunctival changes in four out of five monkeys. These changes closely resembled those found in the early stages of trachoma, but were not followed by pannus and late cicatricial and degenerative developments. The rhesus appeared remarkably resistant to infective matter obtained from human trachoma and its normal conjunctiva differs from that of man in the virtual absence of an adenoid layer. The author considers that the aetiological relationship of the bacterium to trachoma can never be decided by experimental work on monkeys. Trachomatous infection of the monkey's conjunctiva cannot be diagnosed with certainty since insufficient differences exist between the disease induced by inoculation of trachomatous infective matter and that which the animal is liable to contract spontaneously. The disease as it affects Fiji is described by STUPPEL.[2] About half the population of 177,000 are Fijians (92,000) whilst East Indians, who number 73,000, form the next largest community. The investigation dealt with the Fijians only, and over twenty per cent. of these are estimated to suffer from trachoma. Incidence is highest in those districts where the hygiene is bad, and clean villages are almost free. The native language has its own name for the disease, and this constitutes an argument that trachoma is not of foreign origin. All types, well-illustrated in the paper by photographs, are met with; and xerophthalmia with an epidermoid epithelium is not uncommon in old people. The author suggests that the disease may account for the apparent indolence from which the population are sometimes said to suffer. TIONG[3] has compared the effect of acetic acid and chaulmoogra oil in the treatment of sixty-one trachomatous school-children. The type of the disease was follicular and was severe in nineteen cases. He concluded that the two methods of treatment were practically equal as regards efficiency, but that the acetic acid produced more unpleasant effects.

The *Revue Internationale du Trachome* for October 1932 contains a statement by PAGES (pp. 167–172) that his experience of the use of chaulmoogra oil in the treatment of trachoma leads him to the conclusion that no specific action can be claimed for the drug; his colleagues in Morocco, too, hold the same opinion. He suggests that the oil might be used on trial as a prophylactic. C. TRAPESONTEWA of Moscow (pp. 173–179) has conducted some researches on Noguchi's bacterium, and as a result is unconvinced that the micro-organism is the real cause of trachoma. Mme. DELANOË (179–184) argues that trachoma bears pathogenic resemblance to diseases caused by acid fast bacilli such as tubercle and leprosy, and is likely to benefit from treatment appropriate to these diseases. Her arguments, however, are not entirely convincing.

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*For the eighteenth of this series see Vol. 29, pp. 855–858.

[1] THYGESON (Phillips). Experimental Granular Conjunctivitis in Monkeys induced by Bacterium Granulosis.—*Amer. Jl. Ophthalm.* 1932. Apr. Vol. 15. No. 4. pp. 293–306. With 9 figs. [19 refs.]

[2] STUPPEL (R.). Trachoma in Fiji—an Original Investigation.—*Brit. Jl. Ophthalm.* 1933. Feb. Vol. 17. No. 2. pp. 88–97. With 13 figs.

[3] TIONG (Jose O.). Comparative Treatment of Trachoma with Acetic Acid and Chaulmoogra Oil.—*Jl. Philippine Islands Med. Assoc.* 1932. Oct. Vol. 12. No. 10. pp. 502–506.

In the issue for January 1933 F. SCHOUSBÖE (pp. 4–20) contributes a paper which deals principally with the diagnosis of the disease in its early stages. There is, unfortunately, no sure laboratory test which will prove the presence of trachoma and one must chiefly rely on clinical observation for a decision. Signs are considered under two headings: the conjunctival and the limbic. A loupe with oblique illumination in a dark room should always be employed. White specks are visible in the very hyperaemic membrane; whitish beads resembling small blisters are also seen in connexion with the vessels or lying between their branches. These beads are tinged with yellow and are translucent; some are yellowish at the centre and translucent at their edges. The membrane is thickened and the course of the blood vessels is irregular; papillae, too, are present. Larger and more translucent sago-like beads are also found. These changes may occur under the age of three years. Limbus changes occur later with vascularization, scalloping of the surface, and, perhaps, the development of sago-like beads. After the age of ten the lesions of the limbus alone may be sufficient to prove the presence of trachoma. RAGÀNEAU (pp. 33–42) describes the disease as seen in Latakia. He estimates that forty-four per cent. of the general population is infected. Some districts, subject to no exceptional conditions, suffer more than others; the probable explanation is that their inhabitants are more affected by the ravages of malaria, tubercle and syphilis. The arab headdress (Kéfié), usually used as a handkerchief and commonly soiled, is a potent agent in spreading the disease; eye pigments and flies are others. The usual measures are being taken to combat the plague.

Superficial Punctate Keratitis is a disease which deserves some attention owing to the magnitude of the epidemics which have occurred in India, and DOGGART[4] has described cases he has seen in England and exhaustively discussed the various aspects of the condition. He holds with KOBY that the term is applicable to any corneal affection in which the lesion consists of opaque dots involving the epithelium, Bowman's membrane, or the superficial layers of the substantia propria. The clinical picture can be created by a variety of pathological processes. He quotes VERHOEFF's opinion that keratitis disciformis, acne rosacea keratitis, recurrent corneal abrasion and various other conditions besides that under review possess a common pathology, being types of neuropathic keratitis caused by some shock to the ciliary ganglion or to the Gasserian ganglion. Three types of disease were met with; the most numerous (43 patients) was a non-recurrent superficial keratitis, the main lesions being situated in the anterior layers of the substantia propria. In none of these patients was there any loss of epithelium, though epithelial oedema was invariably present. The disease had no association with any previous illness. One-third of those attacked displayed an impaired sensation of the skin of the eyelids on the affected side. Non-irritating applications proved the most suitable treatment and the duration of the trouble varied from a fortnight to many months. The other varieties had more obvious causes, such as exposure to irritating chemical vapours or fragments of dust, or rosacea, and definite erosion of the epithelium was present.

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[4] DOGGART (J. H.). Superficial Punctate Keratitis.—*Brit. Jl. Ophthalm.* 1933. Feb. Vol. 17. No. 2. pp. 65–82. With 1 plate & 1 fig. [34 refs.]

Xerosis of the cornea.—TASSONI[5] records a peculiar affection of the cornea which he observed in a badly nourished negro aged 30. A band of opacity stretched across each cornea. The band was continuous with a triangular area of thickened conjunctiva near the limbus and occupied the portion of the globe corresponding to the palpebral aperture. The surface appeared to be dried but did not stain with fluorescine. The author regarded the condition as a xerosis due to trophic changes.

Cataract.—GNANADICKAM[6] expresses an opinion in favour of intracapsular extraction and recommends a technique which is based on that of STANCULEANU, TÖRÖK and ELSCHNIG. This technique includes orbicular akinesia, conjunctival suture, blocking of the ciliary ganglion, and a control suture in the superior rectus muscle. The lens is removed in its capsule by gripping the anterior capsular layer in a special forceps; the lens is dislocated and pressure is then made with a hook on the limbus to aid the delivery by forceps traction. The operation has definite advantages in that it involves less violence to the eye than is sometimes required in Smith's operation and needs no complicated apparatus as in Barraquer's procedure. A complete iridectomy is performed in the majority of cases.

Koman NAYAR and Narayanaswamy NAYUDU[7] have described the technique employed at the Government Ophthalmic Hospital in Madras for the induction of orbicular paresis and iris anaesthesia. WRIGHT devised a method of seventh nerve block by making an injection at the stylomastoid foramen and this was used for some years with satisfactory results. O'Brien's method of injection near the temporo-mandibular joint had, however, been substituted during the past three years as it was found more easy, certain, and safe. A dental syringe fitted with a fine "Alston" needle about 40 mm. long and a solution of four per cent. novocaine to which a few drops of adrenalin have been added are used to induce both the block of the seventh nerve and of the ciliary ganglion. A longer and coarser needle was found liable to induce orbital haemorrhage when used for retrobulbar injection.

Glaucoma.—KIRWAN[8] has contributed a practical paper on non-congestive glaucoma. He emphasizes the three main signs of the disease: (1) Cupping of the optic disc; (2) increase of intra-ocular pressure; (3) constrictive changes in the visual field. The increase in pressure is usually variable and may be intermittent. Examination with Bjerrum's screen is recommended and described. He remarks that primary non-congestive glaucoma is a sign of a sick eye in a sick body, some gross sepsis often being present. It is of paramount importance to attend to any septic focus. Elliot's sclero-corneal trephining is the operation which he advocates. The author warns medical men regarding the importance of recognizing the early symptoms of the disease. The same writer has furnished a note[9] on the glaucoma which so often attacks sufferers from *Epidemic Dropsy.* Calcutta has recently suffered from a visitation of this disease. Glaucoma is usually a late complication and appears to bear no relation to the degree of severity of the general disease. The type of glaucoma is entirely non-congestive, though the intra-ocular pressure may be remarkably high. The anterior chamber, too, is either normal or deeper than normal, and the pupil reacts well to light and accommodation. The optic disc is commonly hyperaemic and cupping is only found in the late stages. Field defects are similar to those found in primary chronic glaucoma. The patients complain of haloes round lights and of loss of sight. Pain is absent. The rise in ocular tension is caused by oedema of the ciliary body which is induced by toxic amines found in rice which has been badly stored. Medical treatment is most unsatisfactory and a sclero-corneal trephining should be performed without delay; the results of this operation are excellent. After operation a change of air, if possible, from the endemic area is very advisable.

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[5] TASSONI. Xerosis partiel des deux yeux.—*Ann. Soc. Belge de Méd. Trop.* 1932. Oct. 30. Vol. 12. No. 3. pp. 371–373. With 1 fig.

[6] GNANADICKAM (G. Joseph). The Modern Intracapsular Operation for Senile Cataract (According to Stanculeanu-Török-Elschnig Technique).—*Indian Med. Gaz.* 1932. Oct. Vol. 67. No. 10. pp. 559–566. With 5 figs.

[7] NAYAR (Koman K.) & NAYUDU (Narayanaswamy G. J.). Retrobulbar Injections and Seventh Nerve Block.—*Brit. Jl. Ophthalm.* 1933. Apr. Vol. 17. No. 4. pp. 233–235.

[8] KIRWAN (E. W. O'G.). The Diagnosis and Treatment of Non-Congestive Glaucoma.—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 661–666. With 1 fig. & 5 charts.

Ophthalmia Nodosa.—GABRIELIDÈS[10] has recorded a case of caterpillar hair inflammation of the eye. The patient was a man of 60 years who complained of a foreign body having entered his eye when he was cutting a branch from a pine tree on the previous evening. When seen he was suffering from a severe conjunctivitis and keratitis. The discovery of a caterpillar on the patient's hat afforded a clue to the cause of the trouble and an examination with a loupe and slit-lamp revealed the presence of several caterpillar hairs embedded in the conjunctiva and cornea. These hairs are furnished with many little barbs and penetration of the ocular tunics is facilitated by the movements of the eyelids. A channel occupies the centre of the hair, and this contains a poison which is secreted by a unicellular gland; the consequent irritation is thus sufficient to cause a severe keratitis and uveal inflammation with destruction of the eye. When the patient was last seen, three and a-half months after the injury, the eye was quiet and free from discomfort, but three hairs were still lodged in the cornea and the deepest of these rested on Descemet's membrane.

Onchocerciasis.—A most comprehensive account of the ocular complications of onchocerciasis with special reference to the Belgian Congo has been furnished by HISSETTE[11]. He says that morphologically there is little or no difference between the filarial worm described as *Onchocerca caecutiens* in Central America and that known as *Onchocerca volvulus* in Africa. There is reason to believe that the eye complications which occur during the course of the disease are due to the presence of microfilariae in the ocular tissues. Ablation of the encysted parent worm cuts off the supply of larvae, but is unlikely to help much in other respects. Yet the ablation is often accompanied by an allergic response and this may be beneficial. ***Eusimilium damnosum*** and

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[9] KIRWAN (E. W. O'G.). Epidemic Dropsy Glaucoma.—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. pp. 636–637.

[10] GABRIELIDÈS (Const. A.). Kératite par poils de chenille.—*Grèce Méd.* 1932. May–Aug. Vol. 31. No. 5–8. pp. 96–104. With 2 figs. [35 refs.]

[11] HISSETTE (J.). Mémoire sur l'*Onchocerca volvulus* " Leuckart " et ses manifestations oculaires au Congo Belge.—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 433–529. With 29 figs. [7 pages of refs.]

Eusimilium noevei were identified by the author as vectors in Africa. It is interesting to find that the connexion between the disease and the midges has long been known to the natives. The eye complications in African onchocerciasis have an insidious onset. The patient complains of some discomfort and conjunctival hyperaemia is found. A very mild iritis unassociated with any keratic precipitates soon sets in, and this is followed by the appearance of small spots of opacity in the cornea. These opacities lie just beneath Bowman's membrane and are confluent in places; they tend to be most numerous at each extremity of the horizontal meridian and to leave an oval clear area with the long axis vertical at the centre of the cornea; this area may remain unaffected for a considerable time. Vascularization of the corneal periphery may occur. General uveitis with degenerative lens changes and phthisis bulbi may follow. Retrobulbar neuritis may also be found. Destruction of the adult worm in its cyst by removal or by injection, and the use of mydriatics constitute the basis of treatment. Diagnosis can be confirmed by excising a small portion of the bulbar conjunctiva and teasing it in normal saline on a warmed slide. The larvae are easily recognized.

Avertin Anaesthesia.—DAVIS[12] reports favourably on his experiences with avertin anaesthesia in eye operations. He found that the administration of the drug was followed by a fall in the intraocular pressure; and this fall occurred both in glaucomatous eyes and in those whose tension was previously normal. The fall in intraocular pressure seemed to coincide with a fall in blood pressure and to be directly proportionate to the depth of anaesthesia. The avertin was usually given by rectum in a three per cent. dilution with normal salt solution. The dose was 0·1 gm. per kilo of body weight (or 1½ cc. of a three per cent. solution per pound of body weight). A preliminary sedative was ordinarily administered and the customary local anaesthesia employed.

Sleeping Sickness.—HISSETTE[13] advises practitioners to note the visual acuity of every trypanosomiasis patient before starting a course of treatment. Each eye should be tested separately. The eye complications which affect the anterior segment of the globe, viz., chronic iritis, a diffuse form of interstitial keratitis, conjunctivitis, and oedema of the lids, can be identified without special knowledge; but a recognition of the presence and type of an optic atrophy requires training and experience in diseases of the eye. Optic atrophy may be primary or secondary to a mild neuritis. Dysentery, helminthiasis, and the abuse of tobacco and alcohol predispose to the ocurrence of optic atrophy during treatment and should therefore be eliminated. The author uses tryponarsyl injections, employing the technique of Van den Branden. Most of the cases of complete optic atrophy he has seen had been treated by atoxyl.

Glare.—LIVINGSTON[14] has presented a very careful and informative study of the effect of tropical glare upon the eyes of members of the

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[12] DAVIS (Frederick Allison). Tribromethanol (Avertin) as an Anesthetic in Eye Surgery.—*Amer. Jl. Ophthalm.* 1932. Mar. Vol. 15. No. 3. pp. 208–213.

[13] HISSETTE (J.). Considérations pratiques sur des accidents oculaires de la trypanosomiase ou de son traitement.—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 531–538.

[14] LIVINGSTON (P. C.). The Study of Sun Glare in Iraq.—*Brit. Jl. Ophthalm.* 1932. Oct. Vol. 16. No. 10. pp. 577–625. With 15 figs., 3 charts & 2 graphs.

Royal Air Force stationed in Iraq. The majority of those who experience the full glare of a hot season show some signs of fatigue or abnormal weakness of the ocular system. Fatigue of accommodation and convergence is almost universal, whilst reduced light sense is exceedingly common. Glare susceptibility does not appear to be affected by the colour of the iris. Light reflected from the ground is specially productive of symptoms such as photophobia, lachrymation, conjunctival hyperaemia with blepharospasm and pupil contraction; lateral rays are also potent in this respect, and glare protectors should be furnished with adequate protection below and at their sides. Crookes' B.1 glass was found generally useful in reducing the light intensity and absorbing the active rays. Very dark glasses have a depressing mental effect. Many of those who are affected by sun glare are highly strung and of a nervous temperament and in treatment the functional element should not be neglected. Any refractive error must be carefully corrected and the patient should not be allowed to mope in a darkened room but should be allowed suitable employment.

Blind and painful eyeballs.—FEJER[15] has again drawn attention to the value of alcohol injections, made in the neighbourhood of the posterior pole of the globe, as a means of enabling a patient to retain a previously painful sightless eye. Primary absolute glaucoma is the chief indication; but it is essential to be quite certain that the glaucoma is not due to a malignant growth. One cc. of a two per cent. solution of novocaine is injected in the orbital tissues surrounding the posterior pole of the eyeball and after the lapse of five minutes one cc. of eighty per cent. alcohol is injected in the same place. The injection is followed by a severe reaction with chemosis and the patient should be treated in hospital.

SAUNDERS[16] has reported on the nature and causes of blindness in the Wa and Tumu districts of the Gold Coast. Onchocerciasis and vitamin deficiency appear to play some part. In Tumu pterygium seemed to be very prevalent and ulceration tended to occur at the apex of the growth. From the particulars given in the paper it is a little difficult to identify some of the diseases which caused blindness; but retino-choroidal troubles probably played some part.

The Annual Report of the Giza Ophthalmic Laboratory is now much more than an annual report of a Government Department and has developed into a valuable scientific periodical. The sixth number opens with an account of the unveiling of a bust of A. F. MACCALLAN—a well deserved tribute to that surgeon's twenty years' work in Egypt during which the system of relief and of research, which has proved so efficacious, was built up by him. Many case reports, well illustrated by pictures, photographs and micro-photographs, are presented. Trachoma is naturally the subject which engages most attention. It is stated that vitamin deficiency is unlikely to bear any specific relation to Egyptian trachoma since keratomalacia is extremely rare in Egypt and the diet of the majority of trachoma patients is fully adequate as regards accessory food factors. All attempts to isolate the *B. granulosis* from cases of Egyptian trachoma have failed hitherto; and the Director, R. P. Wilson, therefore visited the United States in order to investigate the characteristics of the disease occurring in America. It is one of the major difficulties presented by the problem that authorities differ in their conceptions of the disease. Trachoma, too, may prove to be a syndrome common to several aetiologically distinct conditions. As regards the American Albuquerque Indians scarring was severe in most cases and was best marked in the retrotarsal folds; vascularization of the cornea was seldom so extreme as in most Egyptian cases. Some children, however, showed signs which were typical of the early stages of Egyptian trachoma. Trachoma in America principally affects the rural areas and does not spread in the cities. The living conditions of the Indians of the South Western States were found to be almost identical with those of the Egyptian peasant; purulent ophthalmias, however, are by no means so prevalent.

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[15] FEJER (Julius). The Treatment of Painful Absolute Glaucoma and Other Eye Diseases with Retrobulbar Injections of Alcohol.—*Amer. Jl. Ophthalm.* 1932. Feb. Vol. 15. No. 2. pp. 135–136.

[16] SAUNDERS (G.). A Report on Blindness in Wa and Tumu Districts, Gold Coast, West Africa.—*Jl. Trop. Med. & Hyg.* 1933. Jan. 2. Vol. 36. No. 1. pp. 5–6.

The Bulletin of the Ophthalmological Society of Egypt for the year 1932 contains the opening address of the President, Dr. M. Khalil. In it he recounted the measures taken of late years to combat the causes of blindness (especially trachoma) in the country and to ameliorate the lot of those afflicted. The President, too, described the great services rendered by A. F. MacCallan in the cause. In a paper on the tattooing of corneal scars A. F. Tobgy drew attention to the importance of denuding the epithelium over the entire surface of the area to be dealt with; failure to carry the denudation to the periphery results in leaving a white ring round the blackened area. The platinum chloride and hydrazine hydrate method was stated to have proved most satisfactory and to have caused very little reaction. Favourable results in the treatment of Spring Catarrh by the use of injections of splenic extract are reported by M. F. Sorour. The extracts were prepared from spleens removed for splenomegaly or from fresh spleens obtained from lambs. Trachoma is the subject of several papers. M. A. El-Bakly advances the view that the disease may commence in the lower fornix more often than is generally supposed. R. P. Wilson refers to the vascular changes in the end capillary zone of the limbal system of vessels observed by him during slit-lamp examination of trachomatous patients and suggests that these may prove a valuable aid in diagnosis. Soleiman Bey and M. A. H. Attiah report that treatment with Ether-benzyl-cinnamique ("Jacobson's solution") proved ineffective in their hands. The Bulletin, too, contains many interesting case reports by members.

In the new journal, *Folia Ophthalmologica Orientalia*, R. H. Elliot (1932. Nov. Vol. 1. Fasc. 1. pp. 26–33. The Special Features of Ophthalmic Practice in Tropical Countries) has most ably discussed the problems which confront the oculist in the Tropics. His summary says: "Tropical Ophthalmology has definite characteristics of its own, due to the habits of the people and to the conditions of climate. The latter strongly influence bacterial, parasitic and insect growth. A sympathetic understanding of the people amongst whom the surgeon works is essential for success. There is a virgin field for the propagation of scientific ophthalmology. Disease conditions little known in Europe are so rampant that any one who will take an interest in the elements of ophthalmology can be of great service to the people and can acquire a skill and knowledge in certain lines of work far beyond that which is possible for his European colleagues. In addition, there is an almost untouched field for scientific investigation along many lines. The essential conditions of success are careful observation, meticulous notetaking and close analyses of the results obtained. The publication of interesting observations should be encouraged." Regarding trachoma he remarks that it is a label for a large number of different forms of conjunctival disease and emphasizes the importance of early treatment. Max MEYERHOF (pp. 6–25) describes the great progress which has been made in Egypt during the past fifty years in the treatment of eye disease. Real progress began in 1903 when, owing to the generosity of Sir Ernest Cassel, MACCALLAN was enabled to inaugurate the ophthalmic organization which has been so successful in treating the sick and in educating specialists. WILSON (pp. 52–60) contributes a paper on the slit-lamp appearance of the corneal vessels in Egyptian trachoma. FEIGENBAUM (pp. 105–108) publishes notes of a case of anterior lenticonus. He concludes that the condition depends upon a congenital weakness of the anterior layer of the lens capsule which occurs at an early period of embryonic life, but does not itself develop before birth. The Editor, A. FEIGENBAUM, may be heartily congratulated on his periodical, which constitutes a valuable contribution to ophthalmic literature. *H. Kirkpatrick.*

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

FRYE (William W.) & MELENEY (Henry E.). **Investigations of *Endamoeba histolytica* and Other Intestinal Protozoa in Tennessee : IV. A Study of Flies, Rats, Mice and Some Domestic Animals as Possible Carriers of the Intestinal Protozoa of Man in a Rural Community.**—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 729–749. With 11 figs. on 2 plates. [41 refs.]

The authors consider that this study indicates that house flies are probably a factor in spread of *E. histolytica* in the community studied, but that none of the animals closely associated with man act as reservoir hosts or assist materially in transmission of *E. histolytica.*

1. From droppings and intestines of house flies caught in homes cysts characteristic of *E. histolytica, E. coli, Endolimax nana,* and Giardia, were recovered.

2. Faeces from 127 pigs revealed cysts morphologically identified as *E. histolytica* and Giardia each in one animal. Cysts of *E. polecki* and Iodamoeba were very common; while *Endolimax nana* and Chilomastix were found in a few instances.

3. Autopsies on 48 wild rats caught. No evidence of *E. histolytica. Endamoeba muris* and *Trichomonas* were frequently found; and one group of rats harboured *Balantidium coli. E. muris* from rats was grown in culture and one strain developed typical eight-nucleate cysts.

4. Autopsies on 54 mice caught. No evidence of *E. histolytica. E. muris* present in 24 per cent. and the only protozoon found.

5. Faeces from 128 chickens ; 18 contained cysts of *E. gallinarum.* No other intestinal protozoon found.

6. Faeces from 22 dogs failed to reveal cysts or motile forms of any intestinal protozoon. *H. M. Hanschell.*

TALLO (Francesco). L'importanza delle verdure consumate allo stato crudo e della frutta nella trasmissione della dissenteria amebica. [**Raw Vegetables and Fruits in Transmission of Amoebic Dysentery.**] —*Riv. Sanitaria Siciliana.* 1932. June 1. Vol. 20. No. 11. pp. 745–8, 751–4, 757–8. [16 refs.] English summary (9 lines).

The author examined by direct microscopy and by animal experiment various samples of vegetables and fruit obtained from the gardens of Palermo or from greengrocers in the town, with a view to determining the presence or absence of infective *E. histolytica.*

In his first tests he used vegetables, washed and unwashed, procured directly from gardeners or herb-vendors. Of 204 samples of various kinds he found 7 with amoebic cysts—3 endives, 2 lettuces, 1 specimen each of fennel and celery. Two endives and one lettuce had been washed when collected by the gardener.

Of 58 samples of fruit obtained from shops or itinerant vendors—30 of figs, 20 of plums, and 8 of strawberries—all but one were negative. The exception was a sample of plums purchased from an itinerant fruitseller.

For animal experiment kittens were employed. Before rectal injection of the material found to be infected, these animals were examined daily for 8 days to prove that they were not passing the amoeba in either vegetative or cystic form. Of the 8 in whom the material was introduced by a rectal tube well up the colon only one contracted dysentery, dying 20 days later and showing the typical lesions. One other continued to pass cysts, but without presenting symptoms, the remaining 6 continued quite healthy during the succeeding 8 months' observation The author concludes that the cysts present on these foodstuffs may have little, often no, pathogenicity, and he quotes WALKER & SELLARDS (this *Bulletin*, Vol 3, p. 63) as recording only 4 cases of dysentery resulting from infection of 20 subjects with cysts of faecal origin, the others passing cysts but presenting no signs of intestinal disturbance *H H S*

ANDERSON (Hamilton H) **Amebiasis in Panama and California with Special Reference to Incidence and Treatment.**—*Amer Jl Trop Med* 1932 Nov Vol 12 No 6 pp 459–466

The incidence of amoebiasis in Panama and California was studied, and treatment by carbarsone

A relatively high incidence of amoebiasis (*E histolytica*) presumably exists in Guatemala, Costa Rica, and interior of Panama In Santo Tomas Hospital, Panama City, only 13 9 per cent of a selected group of patients (from men's medical, women's medical, and obstetrical wards) were found to harbour *E histolytica* In recent California surveys, where comparable laboratory methods were used (wet fixed iron-haematoxylin stained smears examined), there has been reported an incidence of 9 8 to 16 per cent Eighty-eight of the 101 Panama cases of amoebiasis were treated with carbarsone (carbamino-phenylarsonic acid containing 28 8 per cent arsenic) given orally in average dosage of 5 0 grams in 10 days The drug was effective without adjuvant in clearing all but one of 37 cases that could be followed during the month of therapy No evidence of arsenic toxicity was noted when total doses to 300 mgm per kilogram body weight were given orally *H M H*

i PERRY (H Marrian) & BENSTED (H J), ii BIGGAM (A G) **Amoebic Dysentery in Infancy.** [Correspondence]—*Lancet* 1932 Dec 17 & 31 pp 1358, 1457–1458

i To resolve doubts whether amoebic dysentery can occur in infancy [*ante*, p 22] the authors draw attention to their published records (1929) of laboratory investigation of 500 cases of acute intestinal conditions in children and infants in Egypt In 73 cases the aetiological agent was *E histolytica*, and in 80 per cent of these amoebic cases the age varied from 5 years to 1 year [this *Bulletin*, Vol 26, p 898]

ii The author reports from Cairo a case of dysentery in a 3-months-old child Sigmoidoscopy with a small instrument revealed amoebic ulcers, and motile *E histolytica* were demonstrated microscopically Later, autopsy disclosed a solitary amoebic abscess one inch in diameter in the liver, and small amoebic ulcers in the large gut *H M H*

ANDREWS (Justin) & ATCHLEY (Floyd) **Negative Occult Blood Tests in Carriers of the Dysentery-producing** *Endamoeba histolytica*—*Jl Amer Med Assoc* 1932 Oct 15 Vol 99 No 16 pp 1340–1342 With 1 fig [21 refs]

The authors adduce some evidence to show that in their hands the benzidine reaction would recognize the presence of blood in dilutions up to 1 : 100,000 and on the basis of the results here recorded it seems unlikely that *E. histolytica* is an obligatory tissue parasite.

That it survived within the lumen of the intestine was indicated by the high proportion of amoebic carriers whose stools gave negative tests for occult blood. Thus of thirteen "symptomless carriers" of *E. histolytica* (eleven of whom had simultaneous infections with other protozoa), twelve were apparently free from any bleeding process in the intestine; and of eleven harbouring protozoa other than *E. histolytica*, eight gave negative occult blood tests. Two of the nine cases of *Giardia lamblia* were positive for occult blood; the single case of *Trichomonas* was negative. *H. M. H.*

GRAY (John) & ANDREWS (Mary N.). *Entamoeba histolytica* **and** *Trichomonas hominis* **in Liver Abscess.**—*Chinese Med. Jl.* 1932. Sept. Vol. 46. No. 9. pp. 902–904.

In the chocolate coloured pus aspirated from a liver abscess *Entamoeba histolytica* and *Trichomonas hominis* were found.

The Trichomonas though searched for in the stools was demonstrated there only by culture. The authors note that *T. hominis* was first described in a liver abscess by KESSEL (1925). He found that many of the Trichomonas had ingested red blood cells, which he claimed favoured the view that in certain circumstances *Trichomonas hominis* became pathogenic [this *Bulletin*, Vol. 22, p. 756]. In the present case no ingested red blood cells were seen, and the authors suggest that the Trichomonas travelled into the abscess cavity by way of a bile duct.

They report that in twelve months 1,095 specimens of stools have been examined, and *T. hominis* demonstrated in 28, or 2·5 per cent. Of this total 15, or 1·4 per cent. only were found in direct smears. Sixty-three cultures were made and of these 13, or 19 per cent. were positive. The presence and relative incidence of *Trichomonas hominis* can more surely be determined by cultural methods. The medium used was saline-serum-citrate solution (ANDREWS 1929) in which they grew abundantly. *H. M. H.*

MATTERA (Antonio). Sindromi clorotiche da amebiasi. [**Chlorotic Syndrome in Amoebiasis.**]—*Giorn. Ital. di Malat. Esot. e Trop.* 1933. Feb. 28. Vol. 6. No. 2. pp. 48–50.

Anaemia in amoebic infection is common but usually of secondary type. In this article the author gives brief notes of five patients, in four of whom *E. histolytica* or its cysts were found in the stools.

They presented an anaemia of the chlorotic type, red corpuscles numbering from 3,800,000 to 4,500,000 per cmm., with haemoglobin 60–70 per cent., or C.I. about 0·8; in one patient the Hb. was 55 per cent. and red cells 4,200,000 or C.I. 0·6. Administration of emetine was followed speedily by cure of the anaemia with disappearance of the entamoeba. *H. H. S.*

GREAVES (Aubrey V.). **Perforative Amoebic Ulceration of the Appendix.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. pp. 397–400. With 2 figs. on 1 plate.

The clinical history of this case was unobtainable but the author gives a careful description of the macroscopic and microscopic findings *post mortem*, and demonstration of the amoebae in the ulcer walls.

He notes that authors have for the most part been unprecise in their reports, basing diagnosis of amoebic perforative ulceration of appendix on clinical grounds without demonstration of the parasite in the tissues. HOGAN (1920) described a case in clinical and pathological detail, and demonstrated amoebae in tissues of the appendix.

[In experimental animals a *post mortem* invasion of tissues by *E. histolytica* has been noted.] *H. M. H.*

i. MONNEROT-DUMAINE (M.). Un signe de l'amibiase intestinale chez l'enfant. [**A Sign of Amoebic Dysentery in the Child.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 947–951. With 2 figs.

ii. LEGER (Marcel). Réflexe cutané abdominal chez les dysentériques amibiens. [**Cutaneous Abdominal Reflex in Amoebic Dysentery.**]—*Ibid.* p. 951.

i. This physical sign consists in flexion of the left thigh. It is either spontaneously present—recalling the right thigh flexion in appendicitis—or may be evoked by deep palpation in the left iliac fossa.

ii. In amoebic dysentery patients, the lower abdominal reflex is always more active on the left side than on the right. The middle and upper reflexes are also more marked on the left than on the right side in milder cases of amoebic dysentery. *H. M. H.*

LEE (S. W.). **Carcinoma of the Cervix Uteri Invaded by** *Entamoeba histolytica*.—*Chinese Med. Jl.* 1932. Nov. Vol. 46. No. 11. pp. 1096–1098. With 2 figs. on 1 plate.

Particulars of two cases of carcinoma of the cervix uteri, in which an amoeba was demonstrated in the tissues of the cervix by biopsy. In neither case could *E. histolytica* be found in repeated stool examinations. Neither patient had faecal fistula *H. M. H.*

i. ACTON (Hugh W.) & CHOPRA (R. N.). **The Treatment of Chronic Intestinal Amoebiasis with the Alkaloids of** *Holarrhena antidysenterica* (**Kurchi**).—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 6–12.

ii. GHOSH (Arabinda Bhushan). **A Study on the Preparation of an Efficient Extract of Kurchi** (*Holarrhena antidysenterica*).—*Ibid.* 13–15.

i. A review of 78 cases of intestinal amoebiasis treated with Kurchi bismuthous iodide. Criterion of cure was five, or more, negative stool examinations on different days after cessation of all treatment.

The authors found that alkaloids of *H. antidysenterica* were powerful curative agents in intestinal amoebiasis. In acute amoebic dysentery intramuscular injections of 2 grains daily of the hydrochloride produced a cure as rapidly as emetine, but were very painful. Bismuthous iodide compound of the total alkaloids was an effective remedy in chronic intestinal amoebiasis. Proportion of probable cures to failures was 3·16 : 1, which compared favourably with KNOWLES' series with emetine bismuth iodide where ratio was 1 : 3·5. The bismuthous iodide compound should be given in doses of 10 grains twice daily preceded by half an hour by a mixture containing one drachm sodium bicarbonate and 40 grains sodium citrate. No strict dietary measures were necessary unless relapse was very acute.

ii. Dr. Ghosh states that besides the specific action of alkaloids in Kurchi, the tannins, mucilage and resinous matters are presumed to act favourably on dysentery; an alcoholic extract besides containing a reasonable amount of alkaloids should also contain considerable quantities of the above tannins and resinous matters. He found that an extract with 60 per cent. alcohol satisfied all these demands, while 95 per cent. alcohol fulfilled these requirements but entailed a loss of some water-soluble matter. Preference between the two preparations is a subject for investigation by clinicians.

H. M. H.

DAVID (Norman), JOHNSTONE (Herbert) & STANLEY (L. L.). **Carbarsone Therapy in Amebiasis.**—*Amer. Jl. Med. Sci.* 1932. Nov. Vol. 184. No. 5. pp. 716–718.

The authors' findings support their conclusion that carbarsone offers a relatively satisfactory, non-toxic, and cheap means of inaugurating therapy in amoebiasis.

It appeared to be quite as effective as emetine, while emetine in clinically effective doses may cause "pathologic damage." Acetarsone and chiniofon have not shown as satisfactory an effect in amoebiasis as has been obtained by carbarsone. The authors found that all but one of a group of amoebiasis cases, observed for 3 or more months, after oral treatment with carbarsone were cleared of *Entamoeba histolytica* (as far as careful stool examinations could reveal), without toxic effect, and without hospitalization. The dosage of carbarsone, 5 gm. in 10 days, may not be enough in severe cases of amoebiasis. Repetition of therapy, supplemented with carbarsone retention enemata, is then indicated. *H. M. H.*

WIGHT (Toynbee) & WIGHT (Virginia). **On the Viability of Cysts of *Endamoeba histolytica* under Variable Conditions.**—*Amer. Jl. Trop. Med.* 1932. Sept. Vol. 12. No. 5. pp. 381–386.

The authors claim to have demonstrated as certain that *E. histolytica* cysts under the most variable conditions of temperature, climate, and environment, may remain alive as long as 27 days. Under the most favourable conditions in the ice box at 7°C. a period of 30 to 37 days had been proven possible by DOBELL. The authors' own experiments with a strain (N.R.S.) sent by post to them in California by DOBELL in London have extended this time to 46 days.

H. M. H.

DHAYAGUDE (R.). Culture de l'*Entamoeba dysenteriae* sur milieux à l'intestin de chat. [**Cultivation of *E. histolytica* on Media including Cat's Intestine.**]—*Ann. Parasit. Humaine et Comparée.* 1932. Nov. 1. Vol. 10. No. 6. pp. 514–519.

A medium containing a small portion of fresh large intestine of cat gave very rich cultures of dysentery amoebae, with development of cysts; these disappeared suddenly after the third or fourth day. A medium containing a small portion of cat's large intestine, heated, was found very useful for cultivation of dysentery amoebae when horse serum could not be obtained. The media were improved by addition of albumin and starch. *H. M. H.*

MELENEY (Henry E.) & FRYE (William W.). **Infection of Kittens with *Endamoeba histolytica* by Direct Injection of Cultures into the Ileum.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Dec. Vol. 30. No. 3. pp. 277–279.

The authors describe the technique of this surgical procedure. They found that lesions produced in kittens by ileal injection did not differ essentially from those produced by rectal injection, except that in the former lesions involving the ileo-caecal valve and adjacent caecum, and terminal ileum, were more frequent. They believe, as a result of this work, that injection into the ileum is much more reliable than rectal injection as a test for pathogenicity for kittens of *E. histolytica* trophozoites in culture. *H. M. H.*

ANDREWS (Justin). **Cysts of the Dysentery-producing *Endamoeba histolytica* in a Baltimore Dog.**—*Amer. Jl. Trop. Med.* 1932. Sept. Vol. 12. No. 5. pp. 401–404. [16 refs.]

Detailed report of chronic amoebic infection in a Baltimore dog, in whose dejecta cysts were found. The evidence made it probable that the parasite was *E. histolytica*, and that the dog may be in nature an occasional carrier of this parasite, constituting a reservoir of amoebiasis for man and dog. *H. M. H.*

CRAIG (Charles F.). **Observations upon Complement Fixation in Experimental Amebiasis in Dogs.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Dec. Vol. 30. No. 3. pp. 270–272. [11 refs.]

This work was undertaken to throw further light on the phenomenon of complement fixation in amoebiasis. FAUST (1930) had shown that the dog is easily infected with *E. histolytica*, and that the lesions following infection were comparable to those found in intestinal amoebiasis in man [this *Bulletin*, Vol. 28, p. 268].

Alcoholic extracts of cultures of *E. histolytica* were used as antigens. Tests were made upon 29 dogs infected with *E. histolytica*, and in all but one a positive complement fixation reaction developed in the blood serum. Of the infected dogs 22 died and disclosed amoebic ulceration in the colon and in all motile *E. histolytica* in the ulcers. Three dogs killed while still suffering from the infection showed both healed and active lesions, with motile *E. histolytica* in the latter, 2 dogs killed after recovery from infection showed healed ulceration in the colon, and no *E. histolytica* could be found in the gut. *E. histolytica* had been found in the faeces of all 28 infected dogs. The one infected dog giving negative complement fixation serum reaction died 7 days after the colonic inoculation with *E. histolytica* from a very severe amoebic colitis. The time of appearance of the reaction varied between 3 and 14 days after inoculation. Twenty-one dogs gave a 4 + reaction; three, 3 +; two, 2 +; and two, 1 +.

Complement fixation tests upon 42 control dogs free from infection with *E. histolytica* were uniformly negative, and at autopsy these animals showed no evidence of amoebic infection. *H. M. H.*

PAULSON (Moses) with the Assistance of Morton MORGENSTERN. **An Accurate Method for the Numerical Determination of *Endamoeba histolytica* in Vitro and its Possible Use with Other Intestinal Protozoa ; Suggested Clinical Application.**—*Amer. Jl. Trop. Med.* 1932. Sept. Vol. 12. No. 5. pp. 387–399. [11 refs.]

The authors give technical details in support of their claim that by use of a haemocytometer *E. histolytica* can be studied quantitatively in culture under varying conditions. Culture methods can thus be accurately analysed and evaluated.

The liquid portion of the culture is gently and thoroughly mixed by means of a capillary pipette and a drop is placed therefrom on the haemocytometer and the organisms counted as are cells in spinal fluid. The technique applies equally well to *Endolimax nana* and with slight modification to *Trichomonas hominis.* It is probably applicable for quantitative cultural observations of other amoebae, ciliates and flagellates.

Differential tabulation of cysts and trophozoites, as well as of several species of protozoa living together, is also possible by addition of an equal quantity of iodine solution (2 gm. I to 1 gm. KI, in 100 cc. water) to a specific quantity of the material to be examined.

In a human case of acute intestinal *E. histolytica* infection and in an *Endolimax nana* infection occurring in a patient with idiopathic ulcerative colitis, the numerical extent of amoebic involvement before and in association with therapy was determined by securing definite quantities of material through the rectosigmoidoscope, and from freshly voided faeces ; a drop of this material in suspension was placed on the haemocytometer and the amoebae were counted. The authors suggest that this method of study has clinical value. *H. M. H.*

BACILLARY DYSENTERY.

PERGHER (J.) & VAN RIEL (J.). La dysenterie bacillaire dans la région des Grands Lacs Africains et la vaccination prophylactique. [**Bacillary Dysentery in the Region of the Great African Lakes, Prophylactic Vaccination.**]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 46–67. With 1 map. [39 refs.]

A careful study revealing that bacillary dysentery becomes epidemic in this region during the hot rainy season of the year. Shiga bacillus is the chief agent in the outbreak. Prophylactic vaccination with an " anatoxin " (made from formalized strains of Shiga, Hiss and Russell types) of 80,000 individuals was followed by marked reduction of morbidity and mortality. *H. M. H.*

McCAY (F. H.). **The Treatment of Bacillary Dysentery by Bacteriophage.**—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 666–672. With 1 chart.

A careful essay to evaluate bacteriophage therapy in bacillary dysentery occurring in Calcutta in European and Anglo-Indian patients. Of 231 cases of bacillary dysentery, 111 had bacteriophage given them and 120 had no bacteriophage. The bacteriophage used was a clear amber coloured fluid manufactured by the Government Research Institute at Shillong from a large number of strains of dysentery bacilli, and *in vitro* was potent against all the strains of dysentery bacilli commonly encountered in Calcutta. The author concludes that bacteriophage treatment is still in its early stages, is well tolerated by bacillary dysentery patients, and in this investigation was successful in effecting speedy cure in 30 per cent. of the cases in which it was used ; but in the remaining 70 per cent. appeared to have little effect clinically. *H. M. H*

ALLODI (A) Contributo alla conoscenza dell'amebiasi e sua diffusione in Piemonte —*Giorn d R Accad Med di Torino* 1932 July-Oct Vol 95 No 7–9 pp 140–150 [16 refs]

ARCHER (J G) The Increasing Incidence of Amebic Dysentery as a Warning for More Thorough Study of Diarrheas — *New Orleans Med & Surg Jl* 1932 Dec Vol 85 No 6 pp 418–421 [11 refs]

CRAIG (Charles F) The Diagnosis and Treatment of Intestinal Amebiasis — *Southern Med Jl* 1932 Dec Vol 25 No 12 pp 1207–1212

GARNETT (M) & STURTON (S D) *Garcinia mangostana* in the Treatment of Amoebic Dysentery —*Chinese Med Jl* 1932 Oct Vol 46 No 10 pp. 969-973

KYU (Kenten) Die Wirkung des Carpains, der Carpainsäure und des Carpainsäureäthylesters auf kultivierte Dysenterie-Amoben —*Taiwan Igakkai Zasshi* (*Jl Med Assoc Formosa*) 1932 Nov Vol 31 No 11 (332) [In Japanese German summary pp 109–110]

MERKLEN (Pr), WAITZ (R), ALBOT (G) & KABAKER (J) Hépatite amibienne à poussées ictériques répétées pendant onze ans Abcès du foie consecutif — *Bull et Mém Soc Méd Hôpit de Paris* 1932 Nov 14 48th Year 3rd Ser No 28 pp 1409–1413

YATO (M) Amoebic Dysentery in the Marshall Islands — *Jl Oriental Med* 1932 Dec Vol 17 No 6 pp 65–69

TYPHUS AND UNCLASSED FEVERS.

MOOSER (Hermann). Essai sur l'histoire naturelle du typhus exanthématique. [**Natural History of Typhus.**]—*Arch. Inst. Pasteur de Tunis.* 1932. July. Vol. 21. No. 1. pp. 1–19. [21 refs.]

Mooser has already shown that the virus of Mexican typhus multiplies in the rat flea and also in cat and dog fleas and in the body louse. The chief difference between the old world and the new world typhus virus, according to Mooser, lies in the different reaction in rats and guineapigs, the old world virus producing an inapparent infection in rats and fever only in guineapigs whereas the new world virus produces fever in rats and fever and scrotal swelling in guineapigs. Mooser points out however that very occasionally scrotal swelling has been noted in guineapigs inoculated with the old world virus (PINKERTON, SPARROW, NICOLLE) and also that the virus of Mexican louse-borne typhus may produce fever only, without scrotal swelling, in male guineapigs (CASTANEDA). The present paper details experiments with a European typhus virus (Tunis) which passed successfully through 3 species of flea, *Xenopsylla chcopis* (rat), *Ctenocephalus canis* (dog) and *Pulex irritans* (human). These fleas were fed on infected rats and then on clean rats or on normal guineapigs: neither the rats nor guineapigs became infected (only a small number of fleas were employed) but when an emulsion of the fleas which had been fed on infected rats was injected into normal male guineapigs these animals reacted and the interesting point was that a considerable number showed a marked swelling of the scrotum. That is to say, the old world virus after passage through the rat and rat-flea produced a similar reaction in guineapigs to that produced by the new world virus. It was noted, however, that this reaction was not permanent; after one or two passages the Tunisian virus ceased to produce swelling of the scrotum in guineapigs. Mooser sums up his paper by saying that the point of capital importance is that prophylaxis of typhus is and remains always the struggle against the louse. This louse menace removed from all peoples, typhus would persist only in the mild endemic form produced by the flea and would no longer endanger humanity. *D. Harvey.*

NICOLLE (Charles). Origine commune des typhus et des autres fièvres exanthématiques. Leur individualité présente. [**Common Origin of Typhus and other Exanthematous Fevers.**]—*Arch. Inst. Pasteur de Tunis.* 1932. July. Vol. 21. No. 1. pp. 32–42.

This paper is a friendly critique of the paper by MOOSER summarized above. MOOSER was inclined to the view that the old world virus had been changed into the new world virus by passage through the rat and rat flea and based his assumption on the change produced in the reaction on male guineapigs; Nicolle agrees that the two typhus viruses, old world and new world, and rat virus and human virus, have a common origin but considers the human virus (louse-borne) to be the older. Nicolle considers that MOOSER puts too much stress on the reaction produced in guineapigs; after all, as he says, the guineapig is but an intruder in the game and is not naturally involved in the typhus picture as are man, the louse, the rat and rat flea [Nicolle also has noted occasionally (1 per cent.) male guineapigs which when inoculated with epidemic virus give a marked scrotal reaction. Passage through the rat and rat flea produces a more marked reaction in the guineapig but does *not* change the epidemic virus into the rat virus (endemic).

Nicolle then discusses the question from the viewpoint of the human patient, the rat, the flea, and the louse. Mexican typhus and typhus as seen in Tunis are clinically very much alike, but possibly the Mexican type is less severe although the rash is more profuse and haemorrhages are more frequent. In the rat endemic typhus virus produces a severe fever, often fatal, whereas the epidemic virus produces no fever at all although the blood of the animal is infective and immunity follows. The flea does not suffer although the virus multiplies in the insect and is present for at least 2 weeks or more. In the louse the epidemic virus multiplies in the cells lining the intestine and the excreta become infective about the ninth day; the insects die about the 21st day. On the other hand the endemic virus multiplies much more rapidly in the louse and kills them as early as the 5th day. Nicolle is of opinion that this difference in the action of the two viruses in the louse has an important bearing on the transmission of the rat typhus virus by the louse. Also as the rat does not die of epidemic typhus, the flea does not necessarily leave the rat and therefore does not attack man.

It is on the difference in the action on rats that Nicolle bases his assumption that the epidemic virus is the older virus, the rat having become tolerant to this infection but susceptible to the endemic virus.

D. H

KODAMA (Makoto). **On the Classification of Typhus in its Epidemiological, Clinical and Etiological Observations.**—*Kitasato Arch. Experim. Med.* 1932. Oct. Vol. 9. No. 4. pp. 357–361.

This attempt to classify typhus fevers is rather likely to confuse matters further, as the writer employs the term "eruptive fever" to describe endemic typhus or Brill's disease. This is unfortunate, since this term has already been used to designate the disease met with in Marseilles and North Africa, and known as fièvre boutonneuse. The author suggests that the virus of endemic typhus or Brill's disease is the original virus and that typhus was a disease of rats only, rarely conveyed to man by the rat flea, but at one time or other this virus established itself in man and the body louse and gave rise to typhus in its epidemic form. *D. H.*

FIALHO (Amadeu). Tifo exantematico de São Paulo. [**Typhus in S. Paulo.**]—*Rev. Med.-Cirurg. do Brasil.* 1932. July. Vol. 40. No. 7. pp. 183–205. With 11 figs. on 6 plates. English summary (2 pages). [Summary appears also in *Bulletin of Hygiene.*]

Though designated "typhus," the condition depicted would appear to be a newly described entity or a marked variation from recognized forms of typhus and typhus-like diseases. Hence the following account must be somewhat full.

In 1929 certain cases were observed in S. Paulo which ran a febrile course with a rash and a typhoid state and in many terminated fatally. Inquiry showed that between 1924 and 1927 there had been seen about one case annually, but in 1929 an extensive outbreak of at least 70 cases occurred; in November 1930 to January 1931, 16 cases; in

October 1931 to February 1932, 21, that is, it was a disease prevailing in, if not limited to, the hot season. As regards sex the distribution was equal; in the first 61 there were 31 males, 30 females nearly all adults, but in the district involved in the general population females preponderated, 3 : 2. Most of the patients were Brazilians, though other races, even Europeans, did not escape; no evidence could be obtained that infection had been imported.

The clinical evolution is interesting and is given in detail in order that comparison may be made with other typhus-like diseases. Onset is abrupt, with headache, shivering and fever; bilious vomiting is frequent and in the earlier cases epistaxis, but this was less common in the later. Myalgia was intense, pressure causing acute pain; stupor set in fairly early. The conjunctiva was injected and on the 4th or 5th day the face and limbs were swollen and appeared shiny in all severe cases and at the end of a week the typhoid state was complete. There might be bleeding from the gums; the bilious vomiting usually ceased in the first week, but occasionally persisted with haematemesis. The temperature rose to 40–42°C., then in 2 or 3 days showed a deceptive fall to rise again before the fatal termination; the pulse, at first strong, soon became weak and rapid (120). If the patient recovered, the temperature usually came down by lysis between the second and third weeks.

The rash, at first roseolar, later petechial and often confluent, appeared regularly on the third day, first on the legs, then involving the whole body including the face and palms. It might also be seen in the mouth and larynx and trachea. Bronchitis was common, and the sputum at times haemorrhagic. The liver rarely showed any enlargement but splenomegaly was constant (to twice the normal); there was albuminuria and, if there were jaundice, bile pigments in the urine. Delirium usually set in on the 3rd or 4th day; in some the cerebrospinal fluid was under pressure, but showed no other change. The fatality rate was between 70 and 80 per cent. and just over half of these deaths (52·2 per cent.) occurred in the first week.

No organism could be cultivated from the blood either aerobically or anaerobically; the blood was, however, pathogenic (see later) not only during the attack but after death; a citrated sample kept in the ice-chest was virulent after 10 days. The Weil-Felix reaction with Proteus X19 and X2 was variable, in some only in a dilution of 1 : 50, in others up to 1 : 6,400.

The *post-mortem* findings need not be detailed minutely; they can be inferred from the clinical symptoms—congested lungs, petechial rash, cutaneous haemorrhages, and, as would be expected, petechiae on the serosae; the spleen is dark and swollen.

Animal inoculations were made into guineapigs and *M. rhesus* with positive results, symptoms and *post-mortem* findings being similar to those in man. Of the blood 2 cc. citrated was the dose injected, or if brain emulsion was used 2 cc. of an emulsion of 1 gm. in 10 cc. physiological saline. The scrotal reaction was fairly constant and Rickettsia were seen in the peritoneum and in Descemet's membrane and in the testicular lesions. The fatality in animals was 70 per cent., higher, that is, than in yellow fever. Rabbits were also inoculated but these animals, strange to say, reacted mildly, the infection in them running a benign course.

The vector has not so far been determined; experimentally, *Amblyomma cajennense* and *Ornithodorus rostratus* conveyed infection;

lice, which were very rare, did not. A list of 5 urban insect parasites and 14 suburban and rural is given, none of which has so far been incriminated, but further study of these will doubtless be undertaken, as all the evidence points to some ectoparasite of some rustic animal.

The disease does not coincide with either of the three main types of typhus—the European, the Mexican, or the Rocky Mountain spotted fever—but rather occupies a position intermediate between the last two. Studies and experimental work on cross-immunity would also probably help greatly in elucidating this interesting infection. *H. H. S.*

KOUWENAAR (W.), SNIJDERS (E. P.) & WOLFF (J. W.). Onderzoekingen over mijtekoorts. [**Mite Fever.**]—*Nederl. Tijdschr. v. Geneesk.* 1932. Oct. 1 & 8. Vol. 76. Nos. 40 & 41. pp. 4640–4647; 4746–4757. With 11 figs. (5 on 1 plate). [50 refs.] English summary.

I. *Introduction.*—Mite fever is an acute, non-contagious, infectious disease with a typhoid-like course, which was described under the name pseudotyphus of Deli by SCHÜFFNER and WACHSMUTH in 1908 as endemic on the east coast of Sumatra. Its most characteristic appearances are the primary lesion, a necrotic ulcer, with swollen regional glands and it is transmitted through the bite of the larva of the mite *Trombicula deliensis.* The best known of these mite diseases is the Kedani or Tsutsugamushi disease, in which, however, leucopenia and a mortality of 40 to 60 per cent. were prominent characters, whereas in the Sumatran form leucopenia was observed in only 10 per cent. of the cases and the mortality was about 5 per cent. That the Weil-Felix reaction was negative in the Japanese form was probably due to the test having been applied with Proteus X19 which is the strain used for the diagnosis of true typhus. It was found that in the Sumatran disease a positive O-agglutination was demonstrable not to X19 but to the anindologenic Proteus X-Kingsbury strain. Cases have been described also in Annam, Saigon, Malaya, Java and New Guinea. The African form, described from S. Africa and Kenya, is a tick fever in which serum agglutination is obtained with X19, X2 and X-Kingsbury. A disease which is common on the east coast of Sumatra, "tropical typhus" (FLETCHER), has a great deal in common with mite fever—clinical course, exanthem, epidemiology and Weil reaction. Of the two forms of "tropical typhus"—shop typhus (X19 agglutination) and scrub typhus (X-Kingsbury agglutination)—it is the latter which more closely resembles mite fever in its epidemiology. The organism, claimed to be causative, of tsutsugamushi disease has been variously named *Rickettsia nipponica* and *Rickettsia tsutsugamushi.* NAGAYO implanted infective material in the anterior chamber of the eye in rabbits, guineapigs and monkeys. He obtained on and in Descemet's membrane an abundant culture of rickettsiae. He and his co-workers named the organism *Rickettsia orientalis* and claimed that it was the virus of tsutsugamushi. It seems probable that mite fever is also a rickettsia infection. These conclusions, however, may have to be held in abeyance with the discovery that, after intraperitoneal inoculation of guineapigs and white rats with normal guineapig brain emulsion, smear preparations from the peritoneum or the tunica vaginalis showed bodies indistinguishable from rickettsia.

II. *Experiments on Monkeys.*—The Japanese observers found that subcutaneous inoculation of the blood of a tsutsugamushi patient in *Pithecus fuscatus* was followed by a typical primary lesion, fever, buboes and leucopenia with rickettsiae in the histiocyte cell elements of the organs. Intracutaneous inoculation gave even better results. The authors of this paper adopted for the most part the intracutaneous method and their test animals were macaci—24 rhesus, 15 cynomologus and 7 nemestrinus. Of these 28 showed definite symptoms. A papular lesion, developing after 8 to 9 days, was the most conspicuous effect. This was distinct from any local reaction of inoculation, which had usually disappeared in 5 days. Swelling of regional glands took place but rise of temperature was definite in only 3 cases. Other general symptoms also were slight in comparison with local effect. Leucopenia with lymphocytosis was evident more particularly in those animals in which the primary lesion was well developed. An examination of the blood of the infected animals was repeatedly made for agglutinins to both H and O-variants of Proteus X19 and Proteus X-Kingsbury. No agglutination was ever obtained to X19. It was found that even before infection an agglutination of 1/25 to 1/50 could be obtained to the O-X Kingsbury strain and positive readings were therefore only recorded when the values after infection were higher than the initial values. The titres, obtained in 16 cases, to this strain were never very high. Cultures of blood and organs from the test animals were usually sterile and never yielded a Proteus-like or other specific organism. Examination of smears and sections for rickettsia-like bodies was difficult and unsatisfactory but they were found five times in the test monkeys at the height of the infection. The general conclusion of the experimental research is that the possibility of producing a localized and slight infection with the virus of mite fever was demonstrated but that evidently the investigation required the use of the species *Pithecus fuscatus* before it could be considered sufficiently striking. *W. F. Harvey.*

WOLFF (J. W.) & KOUWENAAR (W.). Onderzoekingen over mijtekoorts. [**Mite Fever.**]—*Nederl. Tijdschr. v. Geneesk.* 1933. Jan. 21. Vol. 77. No. 3. pp. 269–280. With 8 figs. (6 on 3 plates). [Refs. in footnotes.] English summary.

This, the third part of the work done on identification of Sumatran mite fever with the Japanese tsutsugamushi (Kedani) disease, contains the experiments on rabbits in place of monkeys.

III. *Experiments in Rabbits.*—Citrated blood of a patient suffering from Sumatran mite fever, taken on one of the first days of fever, was used. It was injected into the testicle and further serial injection practised 7 to 9 days after. For this the infected testicle was sterilely removed and smears and sections made. A suspension of triturated tunica vaginalis and testicle in normal salt solution was used in a dose of 0·2 to 0·5 cc. to inoculate the testicle of a fresh rabbit and so on in series. These tests have demonstrated that it is possible to produce specific changes in rabbits' testicles. An orchitis with mononuclear phagocytic infiltration develops in both tunica vaginalis and testicle and in these mononuclear cells rickettsia-like inclusions are found. The changes are very like those described for the infection with the virus of tsutsugamushi (kedani) disease of Japan, while the inclusion bodies are morphologically like the rickettsiae of the various typhus-group diseases In the experiments here performed the changes observed were less constant than in tsutsugamushi, where the virulence increases by rabbit passage Just as in the case of the monkeys used in previous experimentation a certain variability in the outcome of the animal tests was apparent In a certain number of cases it was possible to reproduce in monkeys by intracutaneous inoculation of testicular suspension the typical primary lesion already described *W F Harvey*

MARÇON & AUDOYE Au sujet de quelques cas de typhus endémique observés à bord du cuirassé *Paris* [**Cases of Endemic Typhus on Board a Cruiser.**]—*Bull Soc Path Exot* 1932 May 11 Vol 25 No 5 pp 390–396

In 1931 there were a few mild cases of endemic typhus on board the cruiser "Paris," but in December of that year and in January 1932 there were 9 cases of severe typhus, all recovered but high fever, delirium and great prostration was noted in two cases at least This small epidemic was investigated by the authors Forty rats were collected on board and sent to the laboratory and the virus of typhus was isolated from them It was noted that the outbreak occurred at the coldest time of the year which is contrary to the usual experience The authors are of the opinion that infection took place during the night when the men were sleeping in the 'tween decks in hammocks, they found that the rats ran along the steam pipes under the decks and frequently jumped down on to the hammocks and from hammock to hammock Rats' nests were found below these pipes and the electric cables in such a situation a suitable temperature is available all the year round for the multiplication of fleas and the development of the virus and there is a close association between the rats and the sleeping men *D H*

TONKING (H D) **Preliminary Observations on the Etiology of Kenya Typhus.**—*East African Med Jl* formerly *Kenya & East African Med Jl* 1932 Sept Vol 9 No 6 pp 152–159 [11 refs]

In Kenya Colony for the last fifteen years a form of mild typhus has been recognized but little experimental work has been done and, although it has been shown that the Weil-Felix reaction is positive, Rickettsia have not so far been demonstrated The author utilizing as inoculum the emulsion of an excised primary ulcer succeeded in establishing the virus in guineapigs The reaction produced was similar to that following the inoculation of endemic typhus virus or Mexican typhus virus, *i e*, fever and severe testicular reaction and in smears made from the tunica vaginalis of the experimental animals the author was able to demonstrate by means of Giemsa stain large numbers of Rickettsia

The virus was passed in series through a number of generations and *post mortem* it was possible to demonstrate changes in the brain and other tissues similar to those described by WOLBACH, MOOSER and others Both in the sections of the brain and tunica it was possible to demonstrate Rickettsia-like bodies in suitably stained preparations

The vector in East Africa is not yet known but it has been noted that in the season when most cases occur just after the rains the "grass" rats are driven into the houses and this suggests that some ectoparasite of the rat is concerned. *D H*

ROSS (G. R.). **Eruptive Fevers of the Typhus Group, with Notes on a Fever of the Group observed in Southern Rhodesia.**—*South African Med. Jl.* 1932. July 23. Vol. 6. No. 14. pp. 453–459. With 5 charts & 1 fig. [26 refs.]

An historical review of the group of typhus-like diseases is given and fourteen cases of an exanthematic fever in Southern Rhodesia are described. The cases occurred during the summer and autumn months during the period of the rains. Twelve of the patients were resident in the town of Salisbury, two on farms in the neighbourhood. No connexion could be traced between them although four were troopers in B.S.A. Police and one was a sergeant in the charge of their hospital.

The clinical symptoms were typical of the typhus group of fevers with mental symptoms in severe cases and a profuse maculo-papular rash in all which involved as a rule the palms and soles. In the later cases of the series a very definite tache noire or primary ulcer was quite definitely present. The patients described this as " the bite " but none had observed the insect responsible.

Laboratory investigations.—Although the Weil-Felix reaction was carefully studied, using both indologenic and non-indologenic strains of Proteus no significant positive reaction could be demonstrated. The sera were tested in some cases up to six weeks after discharge from hospital.

Guineapigs inoculated with blood from patients taken during the early stage of the disease did not react. Although no insect vector could be definitely incriminated there was association in all cases with tick-infested dogs. *D. H.*

WICHT (J. F.). **Endemic Typhus in Cape Town.**—*South African Med. Jl.* 1932. July 9. Vol. 6. No. 13. pp. 443–446.

Wicht describes 10 cases of endemic typhus which have occurred in Cape Town in the last 5 years. All were Europeans and free of lice. The Weil-Felix reaction was positive. He discusses the nomenclature of the disease and proposes that such cases should be designated " paratyphus " ; he suggests the possibility of the virus of this type of fever being picked up by lice and transmitted in epidemic form.

D. H.

LÉPINE (P.). Résultats éloignés de l'immunité croisée des cobayes aux diverses souches des typhus exanthématiques humain et murin. [**Results of Crossed Immunity of Guineapigs to Strains of Murine and Human Typhus.**]—*C. R. Soc. Biol.* 1932. Vol. 111. No. 40. pp. 931–933.

As already noted, the author has shown that guineapigs which have reacted to typhus rat virus and recovered are immune to the human virus but this immunity is transitory, whereas guineapigs which have reacted to the human virus and recovered are immune to the rat virus and remain so. Guineapigs which are immune to the rat virus are also immune to the human endemic virus but may not be immune to rat virus of other towns or localities.

The author has extended this work and now finds that there are two groups of rat typhus virus, the one virulent, the other little virulent; the former a good antigen, the latter not; the former produces a good and lasting immunity in guineapigs, the latter does not; and if a virus of Group I is employed in cross immunity experiments no differences can be made out between the human endemic and epidemic or rat virus. *D. H.*

NICOLLE (Charles), LAIGRET (J.), MARCANDIER & PIROT (R). Le rat, animal réactif des typhus endémiques bénins. Longue conservation de leurs virus chez le rat. [**The Rat as Test Animal for Benign Endemic Typhus.**]—*C. R. Acad. Sci.* 1932. May 17. Vol. 194. No. 20. pp. 1704–1706.

In this research the authors employed 3 typhus viruses; 1. African typhus, old world epidemic; 2. endemic typhus of ships; 3. Mexican typhus (MOOSER). Old world typhus produced in rats an inapparent infection, no fever or other symptoms but the blood and brain were infective for guineapigs. The Mexican virus and the virus of ship typhus produced fever and swelling of the scrotum in rats and many of the infected animals died. It was also shown that the brain of rats which recovered was still infective up to 37 days and that of guineapigs up to 40 days after inoculation; thus explaining how readily the virus of endemic typhus may be isolated from wild rats even in the non-endemic areas. *D. H.*

REIMANN (Hobart A.), ULRICH (Henry L.) & FISHER (Luther C). **Differential Diagnosis between Typhus and Spotted Fever: Report of a Case and the Isolation of a New Mild Type of Spotted Fever Virus.**—*Jl. Amer. Med. Assoc.* 1932. May 28. Vol. 98. No. 22. pp. 1875–1879. With 5 text figs. [10 refs.]

Scattered cases of Rocky Mountain spotted fever have now been noted in areas far removed from the original region of its discovery and may be met with at the same time and in the same place as typhus. It is noted that typhus (old world) occurs usually in the winter, Brill's disease, endemic typhus, in the summer and autumn, and spotted fever in the spring and summer. The first named disease is transmitted by lice, the second by the rat flea and the last by a tick—but the only definite method of differentiation is by means of crossed immunity experiments. The authors describe a severe case of fever which on clinical grounds was diagnosed as typhus fever. The titre of the Weil-Felix reaction was 1–1,280 on the 24th day. It was discovered later that the man had been bitten by wood ticks 14 days before he developed fever. Two guineapigs were inoculated with blood taken on the 12th day of the fever and one reacted; from this others were inoculated and a strain of virus (Minnesota) was established. None of the animals died and only about 50 per cent. of the males showed a testicular reaction. Animals recovered from infection with the Minnesota strain were immune to Eastern spotted fever virus but not to the virus of endemic typhus. *D. H.*

GASSER (R. R.). **Rocky Mountain Spotted Fever (Eastern Type). Report of Case.**—*U.S. Nav. Med. Bull.* 1932. Oct. Vol. 30. No. 4. pp. 513–516.

It has recently been shown that a mild type of Rocky Mountain spotted fever occurs in the eastern States of North America as well as or along with endemic typhus or Brill's disease. [This is another instance of the difficulties arising from "place names" for diseases; we now have Malta fever occurring in the Rocky Mountains and Rocky Mountain fever in Marseilles.] The author describes a case which he met with in Maryland in a young naval officer. There was a profuse macular rash involving the arms, thighs, back, palms and soles. The Weil-Felix reaction was positive and there was a history of tick bite about ten days before onset of the fever. The predominant species of tick in the focal areas is *Dermacentor variabilis*. *D. H.*

NICOLLE (Charles). Sur une menace constante d'erreur dans l'étude comparative des virus des fièvres exanthématiques. Portée critique de cette menace. [**Source of Error in Comparative Study of Typhus Viruses.**]—*Arch. Inst. Pasteur de Tunis.* 1932. July. Vol. 21. No. 1. pp. 20–24.

Nicolle points out that in the summer in places such as Tunis rat, dog, cat and human fleas are exceedingly prevalent and it is practically impossible to prevent research workers or experimental animals being bitten. That this is so may account for some contradictory results obtained by workers in research on rat typhus virus. Special precautions should be taken by anyone who intends to undertake such work. All workers should be protected by 3 doses of Weigl's vaccine [see NICOLLE & SPARROW below]. The work should be carried out in the cold weather when fleas are scarce, as few experimental animals as possible should be used and they should be specially housed.

D. H.

BIGGAM (J.). **Three Cases of "Tropical Typhus" occurring in Bangalore, India.**—*Jl. Roy. Army Med. Corps.* 1932. Aug. Vol. 59. No. 2. pp. 96–109. With 3 charts. [25 refs.]

The author gives a historical account of the typhus-like fevers which have been described in various countries; referring, as is only right in the Royal Army Medical Corps journal, specially to the pioneer work of MCNAUGHT in South Africa in the years 1907–11 on a typhus-like disease which he definitely distinguished from enteric fever and identified with Brill's disease. It is of interest to note that at that time, 1910, the suggestion was put forward that this fever was due to tick bite.

The present paper is concerned with 3 cases of typhus-like fever which occurred in Bangalore in 1931. The fever lasted 16 days; the temperature soon reached 105°F., was then remittent from about 102° to 100° for ten days, and fell to normal by lysis on the 18th day. The pulse was relatively slow throughout. The rash was first noted on the 4th day, at first macular then papular. The palms and soles were involved. It became petechial on the 13th day and began to fade on the 19th, staining being visible 10 days after the temperature had reached normal.

The Weil-Felix reaction was negative in Case I; 3 tests were made, the last on the 18th day of disease.

Case II was negative on 7th day, 12th day positive XK type 1/125, X19 type 1/50.

Case III	7th day	XK	negative.
		X19	„
	10th day	XK	1/250
		X19	1/250
	17th day	XK	1/50
		X19	negative
	24th day		all negative.

Blood cultures were sterile in all 3 cases. All had been inoculated with T.A.B. vaccine and a sympathetic rise of the typhosus and paratyphosus agglutinins was noted. There was no history of tick bite in any. *D. H.*

KUNDU (M. L.). **A Case of Typhus Fever in Rangoon.**—*Indian Med. Gaz.* 1932. July. Vol. 67. No. 7. p. 390. With 1 graph.

A case of severe fever with delirium, rapid pulse, typhus-like rash and marked leucocytosis. Weil-Felix reaction positive in a dilution of 1–2,000. The patient was a clerk living under good sanitary conditions; no lice could be found on him or in his house and there was no history of tick-bite. [Nothing is said as regards rats or rat fleas.] No other cases have been reported. *D. H.*

CHRISTIAN (C. R.). **A Case of Typhus due to Tick Bite.**—*Jl. Roy. Army Med. Corps.* 1932. Dec. Vol. 59. No. 6. pp. 445–448. With 1 chart.

HEPPLE (R. A.). **Notes on the Laboratory Investigation of the Case.**—*Ibid.* pp. 448–450.

The patient stated that 5 days before fever commenced she had removed from the skin of the groin a reddish brown tick, not further identified. On admission to hospital at Delhi 5 days later a profuse maculopapular rash was present with injection of the conjunctiva and swelling of the inguinal glands close to the tick bite. The fever lasted about 14 days. The Weil-Felix reaction on the 8th day of the fever was OXK 1/125, OX19 nil; 23rd day, OXK 1/50, OX19 1/25. A guineapig inoculated with 3 cc. of blood taken on the 8th day of the disease showed no definite reaction either febrile or by swelling of the testicle, but had an inapparent infection since other animals inoculated from it developed fever and showed slight increase of the Weil-Felix reaction as compared with normal animals.

D. H.

FLETCHER (William). **Tropical Typhus.**—*Brit. Med. Jl.* 1932. Dec. 24. pp. 1140–1141.

A paper read in the Section of Tropical Medicine at the Centenary Meeting of the British Medical Association in London in 1932. A resumé of our present knowledge regarding tropical typhus.

The symptoms are those of mild typhus; the vascular lesions of true typhus have been shown to be present and Rickettsia have been demonstrated in the tissues of cases. Also the Pinkerton-Mooser reaction has been noted in inoculated guineapigs. The Weil-Felix reaction was also discussed; a positive reaction has been obtained in rats and rabbits inoculated with the virus. *D. H.*

SOUCHARD, MARNEFFE, LIEOU & VIELLE (E.). Un cas de fièvre fluviale du Japon, observé en Cochinchine ; étude clinique et expérimentale. [**Case of Japanese River Fever in Cochin China.**]—*Arch. Insts. Pasteur d'Indochine.* 1932. Apr. No. 15. pp. 97–151. With 57 charts & 6 plates. [24 refs.]

*The first case of tsutsugamushi fever in Cochin China (1929) is described in detail. Clinically there was no difference from the disease as it occurs in Japan and elsewhere, but it was noted that when the virus was inoculated into guineapigs it produced a severe reaction and the animals generally died, whereas the Japanese virus only produces a mild reaction (often inapparent) in guineapigs and the animals do not die. In monkeys the Cochin China virus produces a typical sore and fever reaction identical with that caused by the Japanese virus. *D. H.*

DURAND (Paul). Essais de sérothérapie curative du typhus exanthématique par voie méningée. [**Serotherapy of Typhus by the Meningeal Route.**]—*C. R. Acad. Sci.* 1932. May 17. Vol. 194. No. 20. pp. 1764–1766. With 1 chart in text.

The author treated 14 cases of typhus fever by means of intrathecal dosage of convalescent serum. A single dose of 25 cc. of serum was given. Temperature charts are shown and in two cases the temperature dropped to normal 24 hours after the injection. In 7 cases the temperature dropped several degrees and remained at this lower level and the fever followed a mild course. The author claims that this method of treatment shows curative properties and should be employed whenever possible in typhus fever and in allied diseases. *D. H.*

ZINSSER (Hans) & CASTANEDA (M. Ruiz). **Studies on Typhus Fever. IX. On the Serum Reactions of Mexican and European Typhus Rickettsia.**]—*Jl. Experim. Med.* 1932. Oct. 1. Vol. 56. No. 4. pp. 455–467.

It has already been shown in Europe that the serum of patients recovered from an attack of typhus fever and also the serum of guineapigs after inoculation with the virus of that disease, will agglutinate an emulsion of Rickettsia from the body fluid of heavily infected lice (Weigl vaccine). The authors have corroborated this observation with the European virus and in addition have employed as antigen an emulsion of Rickettsia obtained from rats infected with the Mexican typhus virus and which had been previously exposed to X-ray irradiation. They found that both these emulsions of Rickettsia were readily agglutinated by the sera of infected guineapigs (this is not the case with Proteus X19) and also by the sera of patients convalescent from the disease whether Mexican or European variety, the homologous strain being if anything agglutinated in higher titre. These results ran in parallel with the Weil-Felix reaction but the Rickettsia appeared to be a more delicate indicator, being agglutinated in higher dilution than the Proteus X19. In addition it was shown that rabbits could be immunized by inoculation with the Rickettsia emulsions and agglutinins were produced in their serums. The serum of the rabbit inoculated with the Weigl vaccine agglutinated the emulsion of Rickettsia

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*This case was first described as one of severe typhus (this *Bulletin*, Vol. 29, p 19), then as typhus with the symptoms of Japanese River fever (*loc. cit.* p. 451) and now as Japanese River fever, *tout court*.

obtained from the rats and the sera of both the rabbits agglutinated Proteus X19 ; *i.e.*, a positive Weil-Felix reaction was produced.

D. H.

WOLFF (J. W.). Qualitatieve proteus-X-agglutinatie bij mijtekoorts en tropical typhus. [**Proteus X Agglutination with Mite Fever and Tropical Typhus.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. July 5. Vol. 72. No. 14. pp. 896–914. With 1 fig., 4 graphs & 4 figs. on 1 plate. [25 refs.] English summary.

The results are recorded of the Weil-Felix reaction performed in the course of cases of mite fever (tsutsugamushi disease, type Schüffner, Sumatra) and also in cases of tropical typhus. As antigens for the test both living and killed suspensions of the H and O variants of Proteus X19 and Proteus XK strains were used. The suspensions of the H bacilli were preserved in formalin and the O suspensions in alcohol. It was shown in the course of the work that only the O agglutinins are of importance in typhus fever. The results of the agglutination performed with suspensions of the O variants of Proteus X19 and XK may be summarized as follows :—

In the course of mite fever (tsutsugamushi disease) OXK agglutinins are found exclusively ; these agglutinins appear in the 2nd or 3rd week of fever, the peak point being during the 4th week ; examples of agglutinin curves are given in the paper. A few cases of short fever without primary sore which showed some agglutination of OXK were met with ; these were probably cases of so-called scrub typhus. Quite distinct from these were cases of shop or urban typhus (endemic typhus) : the serum of these cases agglutinated OX19 in about the same degree as did the mite fever cases the OXK suspensions. The typhus-like fevers are divided by the author into two serological groups, (1) those which agglutinate OX19 (typhus fever, tabardillo, endemic typhus, shop typhus), (2) those which agglutinate OXK (tsutsugamushi disease, tick bite fever, scrub typhus). It was noted that a higher degree of agglutination was obtained with living suspensions of OX19 than with the killed suspensions, whereas with OXK the opposite was the case. *D. H.*

LIMA (Carvalho). Bacillo Proteus XL e typho exanthematico de S. Paulo. [**Proteus XL and the S. Paulo Type of Exanthematic Typhus.**]—*Brasil-Medico.* 1933. Jan. 28. Vol. 47. No. 4. pp. 64–66.

This article contains correspondence between the author and Dr. FELIX on the S. Paulo type of typhus [see page 391] and gives account of the serological tests performed with strains of Proteus. These were carried out for O (somatic) and H (flagellar) agglutinins to Proteus X2, X19, XK, and a local strain X167. Of fourteen sera examined 11 agglutinated this last at titres between 1 : 200 and 1 : 16,000, and nine of them agglutinated Proteus OX19 at an equal or even higher dilution. Dr. FELIX determined Proteus X167 to be " antigenically correspondent to the virus of the endemic typhus of S. Paulo " and he proposes to designate it Proteus XL (the L indicating Lima strain). *H. H. S.*

GOMES (Luis Salles). Présence de Rickettsias dans l'endothélium et dans les parois des vaisseaux testiculo-scrotaux de cobayes infectés expérimentalement du typhus exanthématique de Sao Paulo. **[Rickettsia in the Endothelium and Testicular Vessel Walls of Guineapigs infected with S. Paulo Typhus.]**—*C. R. Soc. Biol.* 1932. May 20. Vol. 110. No. 17. pp. 134–136.

The author refers to previous work with the Sao Paulo strain of typhus virus in which Rickettsia was demonstrated in the cells of Descemet's membrane in the eyeball of infected guineapigs and also in the cells in peritoneal membranes after inoculation. [See MONTEIRO, this *Bulletin*, Vol. 29, p. 778.]

The author has now been able to demonstrate Rickettsia in the cells lining the testicular blood vessels in inoculated guineapigs and notes that his results are comparable to those of WOLBACH in Rocky Mountain fever, the organisms being found not in the cells of the serous membrane but in those of the muscular layer of the blood vessels.

No intranuclear forms were ever noted nor were they found in polymorphonuclear cells or in the large mononuclears. Those guineapigs in which Rickettsia were found in the tissues showed high fever and a severe reaction in the testicles. Although excellent preparations were obtained by means of Giemsa stain it was noted that the preparations faded out after 24 hours. This point is being further investigated.

D. H.

CAMINOPETROS (Jean). La réaction scrotale du cobaye provoquée par inoculation des tiques (*Rhipicephalus sanguineus*) infectées avec le virus de la fièvre boutonneuse. **[Scrotal Reaction provoked in the Guineapig by Inoculation of Ticks infected with Eruptive Fever.]**—*C. R. Soc. Biol.* 1932. June 10. Vol. 110. No. 20. pp. 344–346.

The authorities in the South of France have always insisted that eruptive fever of Marseilles is definitely distinct from endemic typhus and have principally based their opinion on two facts, (1) that the Weil-Felix reaction is not positive in eruptive fever, and (2) that guineapigs are not susceptible to the virus. It has, however, been shown by DURAND [this *Bulletin*, Vol. 29, p. 791] that a positive Weil-Felix reaction can be elicited in the disease and now Caminopetros shows that the guineapig reacts to the virus of eruptive fever just as it does to the virus of endemic typhus, *i.e.*, with fever and swelling of the scrotum. Previous attempts had been made to infect guineapigs by injection of the blood of cases of the fever, but it has been shown that the virus is only present in the blood in small quantity (20 cc. of blood is required to carry on infection from man to man).

The author employed in his experiments an emulsion of ticks collected from dogs in an infected area. Intraperitoneal inoculation of male guineapigs was followed after an incubation period of 4 days by fever accompanied by marked scrotal oedema ; the fever lasted from 4 to 6 days and the scrotal reaction 8 days. The skin of the scrotum was infiltrated with small haemorrhages and small necrotic points were noted. The testicles were hard and adherent to the skin and could not be replaced in the abdominal cavity. In animals which were killed thickening and haemorrhagic infiltration of the tunica vaginalis was observed. In short the conditions produced were exactly similar to those seen on injection of the virus of endemic typhus and known as the Neill-Mooser reaction. Smear preparations of the tunica vaginalis stained by Giemsa showed very numerous Rickettsia-like bodies and proved to be sterile on cultivation.

The ticks used were obtained from the district of Volo where eruptive fever is common ; ticks collected from dogs in Athens, where the fever does not occur, injected into guineapigs did not produce any reaction. *D. H.*

LE CHUITON (F.) & MOUREAU (M.). Présence d'un virus du typhus murin chez les rats de Bordeaux. Disparition de la périorchite du cobaye au cours des passages. Réceptivité du lapin à ce virus. [**Presence of Virus of Murine Typhus in Bordeaux Rats.**]—*C. R. Soc. Biol.* 1932. Oct. 14. Vol. 111. No. 30. pp. 167–169.

From rats collected in Bordeaux, 5 *decumanus* and 1 *alexandrinus*, an emulsion of the brains was made and inoculated into guineapigs, which gave the usual reaction of fever and swelling of the scrotum. The interesting point was that guineapigs sub-inoculated from these showed fever but no scrotal swelling. A rabbit inoculated from the 3rd passage guineapig (no orchitis) reacted with fever and swelling of the scrotum, and on the 16th day gave a positive Weil-Felix reaction. Brill's disease has not been reported in Bordeaux. *D. H.*

ROCHAIX (A.), SÉDALLIAN (P.) & COUTURE (E.). Au sujet du rat réservoir de virus d'un typhus à Lyon. [**Rat Reservoir of Typhus Virus at Lyons.**]—*C. R. Soc. Biol.* 1932. Dec. 9. Vol. 111. No. 38. pp. 817–818.

The sera of 65 *M. decumanus* were tested for agglutinins for Proteus X19 ; 9 gave positive reactions. Emulsions were made of the brains of six of the rats which had given positive reactions and inoculated into guineapigs ; after an incubation period of 14 days fever developed but swelling of the scrotum was not noted. The fever lasted 5 or 6 days. *D. H.*

PANAYOTATOU (A.). Les rats réservoirs du typhus exanthématique à Alexandrie. Sérum sanguin de *Mus norvegicus* et *Proteus* X_{19}. [**Rat Reservoirs of Typhus in Alexandria.**]—*C. R. Soc. Biol.* 1932. Nov. 4. Vol. 111. No. 33. pp. 430–431.

In 1929 the author isolated a strain of Proteus X19 from rats in Alexandria and showed that the serum of these rats agglutinated this bacillus in a dilution of 1/800. In 1932 the sera of 50 rats was tested with 3 strains of X19 ; 42 per cent. gave a positive Weil-Felix reaction, the highest titre being 1/1,000. *D. H.*

PANAYOTATOU (A.). Les rats et les puces, réservoirs et vecteurs du typhus exanthématique à Alexandrie. [**Rats and Fleas as Reservoirs and Carriers of Typhus at Alexandria.**]—*C. R. Soc. Biol.* 1932. Nov. 14. Vol. 111. No. 34. pp. 496–498. With 1 fig

Fleas (*X. cheopis*) were collected from rats in Alexandria and an emulsion was made and injected into guineapigs. These animals reacted with fever, marked loss in weight and swelling of the scrotum.

Before inoculation their serum gave a negative Weil-Felix reaction but during convalescence a positive reaction, 1/100, was obtained. Numerous Rickettsia were seen in stained smears from the tunica vaginalis of infected guineapigs *D. H*

LÉPINE (Pierre) Sensibilité du spermophile au typhus exanthématique [**Susceptibility of the Spermophile to Typhus.**]—*C R. Acad Sci* 1932 July 11 Vol 195 No 2 pp 188–191

The spermophile inoculated with the virus of endemic typhus (rat) develops fever and general weakness of about four days' duration, there is no testicular or scrotal swelling in the males nor can Rickettsia be demonstrated in smears from organs The brain emulsion is infective for guineapigs during the incubation period and is still infective on the 31st day 3 weeks after the fever has ceased The spermophile also reacts to the virus of epidemic typhus with fever which sometimes terminates fatally Spermophiles in nature do not carry the virus, all attempts to isolate the virus from the normal animals failed

D H

WALKER (Ernest Linwood) & SWEENEY (Marion A) **Some Infections simulating Experimental Typhus in the Guinea Pig.**—*Amer Jl Trop Med* 1932 May Vol 12 No 3 pp 217–222

During work on the transmission of typhus virus the authors have noted that organisms may be encountered which give rise to a fever curve and gross pathology resembling but not identical with that of typhus, these reactions can be passed in series and may give rise to error

The first of these infections encountered was that due to a protozoon of the genus *Toxoplasma* If injections are made in guineapigs into the skin the protozoon may be readily found at the site of the lesion but not in the blood or spleen, whereas if injections are made intraperitoneally the organism cannot be seen in the blood or tissues. Rabbits on the other hand react readily to the infection and the parasites can be easily seen in their blood Guineapigs which have reacted to this protozoon are not immune to typhus virus Checks such as these are necessary from time to time to prevent error

Another series of guineapigs became infected with a small bacillus of the Salmonella type, this also gave rise to fever and a pathology resembling that of typhus This bacillus was not agglutinated by typhus serum nor did it produce agglutinins for Proteus X19 in the sera of inoculated rabbits, animals recovered from the infection were not immune to typhus virus To avoid error it is advisable when transferring the virus from guineapig to guineapig to culture the blood and organs at the same time, if present this small bacillus can be readily isolated

The authors made many attempts to cultivate Rickettsiae but failed In view of the close serological association of Proteus X19 with typhus they carried out a very intensive research but in spite of thousands of attempts failed to isolate any strain of Proteus from guineapigs infected with typhus or Rocky Mountain fever virus They succeeded in infecting guineapigs with small doses of Proteus X19 and produced a fever curve and pathology resembling that of typhus but animals recovered from Proteus infection were not immune to typhus virus

D. H.

DYER (R. E), WORKMAN (W G), RUMREICH (A) & BADGER (L F) **The Preparation of a Vaccine from Fleas infected with Endemic Typhus.**—*Public Health Rep* 1932 June 17 Vol 47 No 25 pp. 1329–1331.

The fleas utilized in these experiments were of the species *Xenopsylla cheopis* After feeding on infected rats they were collected and emulsified in salt solution The emulsion was phenolized and the supernatant fluid in doses of 1 cc was injected into 24 guineapigs, 12 of which received a second dose of 0 5 cc one week later Out of 20 tested later 16 were found to be non-immune A stronger vaccine was prepared and 44 guineapigs received 1 cc each, 6 out of 8 were non-immune after test 3 weeks later, but of the remaining 16 8 were immune when tested after another 3 months In the first experiment no evidence of protection was shown but in the 2nd experiment there was definite evidence It is proposed to try again with a more potent vaccine, that is employing fleas containing a greater amount of virus, 1/10,000 to 1/100,000 of a flea affording an infective dose, whereas in the above experiments 1/5 flea was required *D H*

NICOLLE (Charles) & SPARROW (Hélene) Application au cobaye et à l'homme de la méthode de vaccination contre le typhus exanthématique par emploi d'intestins phéniqués de poux (méthode de Weigl) [**Weigl's Vaccination Method applied to Guineapig and Man.**]—*Arch Inst Pasteur de Tunis* 1932 July Vol 21 No 1 pp 25–31.

Technique of preparation of Weigl s vaccine – Clean lice are bred in the laboratory, a few of these are inoculated by the anal route by means of a special glass pipette The virus is obtained either from the blood of a case of acute typhus or from the blood or organs of an infected guineapig The lice become infected and Rickettsia multiply rapidly in the cells lining the intestine these cells eventually rupture and the Rickettsia are discharged in enormous numbers into the intestine, the lice eventually (in 9 or 10 days) succumbing to the infection Fresh lice are inoculated by the same method from these lice, an expert worker inoculates 1,000 lice in a day It is calculated that a single louse may contain from 10 to 100 million Rickettsia The infected lice are dissected and the intestines removed in a sterile manner and ground up in a normal saline and a small quantity, 0 5 per cent, of carbolic added to the emulsion this forms the vaccine and the dose is approximately 150 intestines per man, divided into 3 doses

WEIGL has shown that guineapigs and monkeys can be protected from infection by means of this vaccine Nicolle repeated this work and found good protection in 5 guineapigs and one monkey, none of the protected animals reacted to test doses whereas all the controls did so Four children were inoculated each with 3 doses of vaccine and their sera gave a positive Weil-Felix reaction after the third dose These children were given a test dose but showed no reaction Nicolle recommends that all workers with typhus virus should be protected by vaccination. *D. H.*

GROUP OF TYPHUS-LIKE DISEASES

[See Major-General D HARVEY's article on "Typhus and Typhus-like Diseases," pp 343–349 above]

Disease	Distribution	Reservoir	Vector	Virus	Clinical Symptoms, Fever Rash, Nerve Symptoms, etc	Neill-Mooser Reaction in Guineapigs	Typhus Nodules	Weil-Felix Reaction B proteus X	
								Type X 19	Type X K
Epidemic Typhus	Worldwide	Man	Louse .	*R prowazeki*	Present	Only very occasionally	+ + +	+ + +	—
Endemic Typhus Brill's Disease	Worldwide	Rat	Flea *X cheopis*	*R prowazeki*	Present	Constant	+ +	+ + +	—
Rocky Mountain Fever	N America West and East	Rabbit, Squirrel, etc	Tick *D venustus* *D variabilis*	*R rickettsii*	Present	Constant + gangrene	+ +	+ ±	+ ?
Japanese River Fever	Japan Sumatra Malaya Cochin China	Field Mice	Mite *T akumushi*	*R orientalis*	Present + primary ulcer	Present	+ +	—	+ ±
Fièvre boutonneuse	Mediterranean region	Dog	Tick *R sanguineus*	*R conori*	Present + primary ulcer	Present	+ +	+ ±	—
African Tick Typhus	S Africa ...	Dog ? .	Tick *R sanguineus*	Rickettsia present	Present + primary ulcer	Present	+ +	+ ±	+ + ±
Tropical Typhus	Malaya Sumatra Australia Kenya								
"W" Form	. . .	Rat	Flea *X cheopis*	*R prowazeki*	Present	Present	+ +	+ + +	—
"K" Form	.	?	?	*R prowazeki*	Present	Present	+ +	—	+ + +

With a subject which is being advanced daily on one or other of its fronts, a table such as this can have only a relative value Other tables differing in detail exist, *e g*, *Jl Trop Med & Hyg*, 1930, Vol 33, facing p 302 (JEWELL & CORMACK), *Jl of Hygiene*, 1931, Vol 31, p 244 (FELIX & RHODES), *Ztschr f Immunitätsf u Experim Therap*, 1932, Vol 74, p 360 (KRAUS), *Annals of Internal Med*, 1932, Oct, Vol 6, No 4, pp 550–553 (TOOMEY); and *Boll Ist Sieroterap Milan*, 1933, Vol 12, pp 244–5 (REITANO)

S. Paulo typhus is omitted because when the article was received knowledge of this form was uncertain (see FIALHO, this *Bulletin* p 391). More recent work suggests the transfer of Kenya typhus to the African tick typhus group.

DENGUE.

McSwan (D. M.). **The Dengue-like Fevers.**—*Malayan Med. Jl.* 1932. June. Vol. 7. No. 2. pp. 49–52. With 1 chart.

The author divides the dengue-like fevers into two groups, (*a*) 3-day or 3 to 5-day fever, (*b*) 7-day or 7 to 10-day fever. These fevers are accompanied at some period of the febrile or post-febrile state by a variety of exanthemata, which may range from a slight reddening of the skin of the neck to a definite macular erythema or morbilliform eruption. Three types of the 3-day fever are noted: (1) sandfly fever type with injected conjunctivae, (2) similar but with rash and diarrhoea in addition, (3) an abortive dengue-like fever with rash and pains in the joints. Two types of the 7-day fever are met with: (1) fever continuous for seven days with intense joint pains and morbilliform rash, (2) similar to (1) but without the joint pains. *D. Harvey.*

Gauguet. Sur quelques cas de dengue observés à la marine à Dakar. [**Dengue in the French Navy at Dakar.**]—*Arch. Méd. et Pharm. Nav.* 1932. July–Aug.–Sept. Vol. 122. No. 3. pp. 263–269.

In view of the occurrence of several causes of yellow fever in stations visited by the French West African fleet the author was on the lookout for suspicious cases. All cases of fever were treated under nets or preferably in screened wards; the blood was examined for protozoa and the amount of albumen in the urine carefully estimated. Several cases of dengue were detected, and one at least of these showed an amount of albumen in the urine which, apart from other symptoms, might have been considered diagnostic of yellow fever. All the patients recovered. *D. H.*

Hoffmann (J. M.), Mertens (W. K.) & Snijders (E. P.). De overbrenging van de Javaansche "endemische dengue" naar Amsterdam. [**Javanese "Endemic Dengue" transferred to Amsterdam.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Aug. 30. Vol. 72. No. 18. pp. 1195–1199. With 5 figs. on 2 plates.

Dried serum from a case of endemic dengue of Java produced a typical case of the disease at Amsterdam, after being kept for 285 days. The serum of the patient at Amsterdam injected into another individual gave rise to a similar disease. Both these cases were so like the previously studied cases of spontaneous and experimental dengue of Sumatra that it does not appear justifiable to differentiate between Javanese and Sumatran dengue. Neither is there sufficient reason to consider the so-called "van der Scheer's fever" as a separate disease (see also this *Bulletin*, Vol. 28, p. 621). *W. J. Bais.*

Findlay (G. M.). **The Relation between Dengue and Rift Valley Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 157–160.

Findlay, working with a dengue virus obtained from Amsterdam, found that monkeys which had been infected with this virus and recovered were not immune to subsequent inoculation of the virus of Rift Valley fever. On the other hand monkeys which had recovered from Rift Valley fever reacted later to dengue virus as shown by leucopenia and infectivity of the blood for a volunteer. *D. H.*

LORANDO (N. J.). Etude critique sur l'épidémie de l'île de Syra. Dengue et spirochétose. [**The Syra Epidemic: Dengue and Spirochaetosis.**]—*Bull. Soc. Path. Exot.* 1932. June 8. Vol. 25. No. 6. pp. 552–558. [12 refs.]

A sudden outbreak of fever with jaundice occurred in the island of Syra in the Greek Archipelago; 25 cases in all were reported, 12 with severe, 13 with light jaundice; 3 patients died. Bilious vomiting was a prominent symptom in the severe cases, a symptom that has not so far been reported in dengue, which had been suggested as a possible diagnosis. The urine contained a trace of albumen from the commencement of the fever and later a larger amount with bile salts and bile pigment. Complete anuria was noted in one of the fatal cases. Bile pigments were absent from the stools. A morbilliform rash was noted, becoming haemorrhagic in some cases. A diagnosis of spirochaetal jaundice was made, and confirmed by successful inoculation of a guineapig. Dengue was present in the island at the same period. The author notes that Dr. FLONQUIN described cases of spirochaetal jaundice in Smyrna so long ago as 1835 under the name of "icteric typhus," or "yellow fever of Smyrna." *D. H.*

PURCELL (Frederick W.). **Notes of a Case of Fever in Some Respects resembling Mild Dengue Fever.**—*West African Med. Jl.* 1932. July. Vol. 6. No. 1. p. 6. With 1 chart.

A case of fever seen in Nigeria with rose rash on abdomen, chest and arms, not on extremities. No bone pains but pains in muscles and post orbital headache. Four days fever, one day intermission and secondary rise on 6th day. *D. H.*

CULLEN (J. P.). Dengue Fever.—*Jl. Trop. Med. & Hyg.* 1932. Oct. 1. Vol. 35. No 19 pp 289–290. With 3 charts.

WATSON (Malcolm). A Case of Dengue Fever with Hyperpyrexia—*Malayan Med. Jl.* 1932. Sept. Vol. 7. No. 3. p. 92.

REVIEWS AND NOTICES.

OLMER (D) [Professeur de clinique médicale à la Faculté de Médecine de Marseille] & OLMER (Jean) [Chef de clinique médicale à la Faculté de Médecine de Marseille] **Fièvre boutonneuse. Fièvre exanthématique du littoral Méditerranéen.** [Fièvre Boutonneuse: Eruptive Fever of the Mediterranean Coast]—106 pp With 10 figs (1 coloured) 1933 Paris, VI Masson et Cie, 120 Boulevard Saint-Germain [17 fr]

This little book gives a succinct account of the interesting disease which the authors have been studying in Marseilles for the last ten years In 1925, one of them (D Olmer) first drew attention to its occurrence in the suburbs of the town and, later, he gave it the name of *Fièvre Exanthématique* Subsequently, it was shown to be identical with an eruptive fever described in 1910 by CONOR and BRUCH in Tunis, under the name *Fièvre Boutonneuse* (*bouton*=pimple), and it was decided at the first International Congress of Hygiene at Marseilles, as suggested by Professor NICOLLE, to retain "*fièvre boutonneuse* as the name of the fever in question, and to reserve the term *fièvres exanthématiques* ' for the whole group of those eruptive fevers of which typhus exanthematicus is the type *Fièvre boutonneuse* is itself a member of this group indeed, its close resemblance to typhus was the cause of much anxiety and grave apprehension when it appeared in Marseilles

It was regarded, at first as a rare disease of limited distribution, but now—in addition to Marseilles and its environs, where it has become more common it has been recognized throughout the Midi (Nice, Cannes, La Ciotat, the Var, Nimes, Montpellier, etc), along the Mediterranean coast (France, Spain, Morocco, Algiers, Tunis, Tripoli, Egypt, Greece, Syria) and in Portugal, Rumania and the Sudan The authors look upon it as a new disease in France, and they think that it was probably imported from Africa

Its nosological position has been the subject of much debate The Weil-Felix reaction is often positive in dilutions of 1 in 100 to 1 in 1,000, but it is inconstant and does not occur until early convalescence It is evident from this that the disease is related to typhus but that it is not identical with it Sections of the skin show a thickening of the endothelium of the small vessels and precapillaries, with a surrounding perivascular infiltration, such as is seen in other diseases of the typhus group. Clinically, it is milder than typhus and though restlessness and delirium may occur, they rarely pass into stupor, it almost invariably terminates in recovery except in the aged, and the case mortality is only 2 per cent The temperature charts given in this book show that though the duration of the fever is the same as in typhus, it is not maintained at a high level with a sudden fall at the end, but declines by more gradual lysis The rash resembles that of typhus, but its distribution is rather different, the face, the palms and soles are spared in typhus, but in *fièvre boutonneuse* they are affected, as they are in Rocky Mountain fever and the tsutsugamushi disease A small primary lesion, resembling the characteristic lesion of the latter disease, is often present, it is a small black scab, surrounded by a red areola, and occasionally the nearest lymphatic glands are enlarged. This black spot was first described by PIÉRI, BRUGEAS and BOINET in 1925, when they gave it the name of the *tache noire*

The *fièvre boutonneuse* differs from typhus in its epidemiology and its etiology even more than in its symptomology It occurs quite apart from infestation with lice, it is a disease of the summer instead of the winter, it occurs in limited areas, it does not spread from person to person and there is no necessity to isolate the sick, it attacks the clean and well-to-do as often as it attacks others, farmers and gardeners are frequent victims. BURNET and D Olmer, in 1928, put an end to the discussions as to the identity of *fièvre boutonneuse* with typhus, by infecting monkeys with these two diseases and showing that there was no cross immunity between them.

The blood is infective during the course of the fever, and the disease can be transmitted from the sick to the healthy by its inoculation, but the authors and their colleagues have shown that lice fed upon patients, or infected monkeys, do not convey the disease They had already drawn attention to the history of tick-bites and of close association with dogs given by many of their patients, when, in 1930, DURAND and CONSEIL succeeded in infecting volunteers by inoculating them with an emulsion of ticks (*Rhipicephalus sanguineus*) collected from a dog belonging to a patient who was suffering from the disease Similar results were obtained by BRUMPT, and by JOYEUX and PIERI, with ticks collected from patients' houses These observers showed that the infection was transmitted from the adult tick to its eggs, and also from the nymph to the adult, as in Rocky Mountain fever

The authors look upon the *fièvre boutonneuse* as being more nearly related to Rocky Mountain fever and the tsutsugamushi disease than to typhus and as being quite distinct from the rat-borne, typhus like fever described by MARCANDIER and PLAZY (with a regularly positive Weil-Felix reaction) in the harbour of Toulon (a fever which appears to be a mild form of non-louse-borne typhus, akin to Brill's disease)

W Fletcher

SOCIÉTÉ DES NATIONS **Programme des cours de malariologie institués par l'organisation d'hygiène de la Société des Nations. I. Cours théoriques avec travaux pratiques donnés à Hambourg, Paris et Rome. II. Stages d'application dans des régions malariques.** [Program of Courses in Malariology organized by League of Nations] 1933 C H/Malaria/190 24 pp

The Malaria Commission of the League of Nations noted in the course of its visits to malarious parts of Europe that the number of doctors trained in the epidemiology of the disease and the application of antimalarial measures was insufficient It has therefore organized courses of malariology both theoretical and practical in Paris Hamburg and Rome In London the usual course of parasitology can be taken at the School of Hygiene with modifications The three courses are here described The second part of the plan consists in two separate months spent in practical work in a malarious country and here Spain and Yugo-Slavia (Skoplje) have been pressed into service The conditions of entry to these courses, dates, fees, methods of application, are here set out *A G. B.*

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BACTERIOPHAGE WITH SPECIAL REFERENCE TO PLAGUE AND CHOLERA.*

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Death, Recovery, Immunity and the Bacteriophage.

If we consider the bacteriophage as a parasite of the bacterium, the bacterium as cause of infectious disease, and immunity as resistance of the higher organism to the growth and development of the bacterium, we can state with D'HERELLE in very simple terms the significance of death, recovery and immunity to disease. The cholera vibrio or the plague bacillus invade the human being and the result of their growth is disease followed by death or recovery. This issue " is not dependent upon a phenomenon of immunity as hitherto believed but upon the behaviour of the bacteriophage " (D'HERELLE 1927). The argument for the correlation of the presence of bacteriophage and recovery may be exemplified by cholera cases—cases with no bacteriophage present all die ; cases with feeble bacteriophage, which disappears, also die ; cases with strong bacteriophage at the outset recover promptly : cases with weak bacteriophage, which increases in potency, recover with some delay, as also may cases with fluctuation of potency (D'HERELLE and MALONE, 1927.) With recovery a period of immunity to the disease is acquired. In the same way as the bacterium makes its invasion so the bacteriophage invades the bacterium and again the result is death or recovery—of the bacterium. Immunity of the bacterium to the bacteriophage is consequent upon recovery and it becomes resistant to lytic action. Such a bacterium may be lysogenic or it may be non-lysogenic. Lysogenesis by a bacterium is explained as a symbiosis between phage and bacterium. Much of this explanation is one of analogy especially in this matter of symbiosis. It affords a basis, however, for an explanation of the characters of disease in terms of bacteriophage. Much would depend for the substantiation of the theory upon findings which were in agreement with it. This has not always been the case. PONS (1932 a) who injected bacteriophage in plague (in man and animals) could find no parallelism between its persistence in the organism and the progress of infection. The infection might be fatal even though bacteriophage was demonstrable during the whole course of the disease and even at death. But the phage theory has been further extended. According to D'HERELLE the lysin produced by the phage is identical with the familiar "opsonin" of the sero-cellular theories of phagocytosis, while acquired immunity is the result of the distribution of the lysed products of the infecting bacterium throughout the body. This is a composite explanation which incorporates, with the new conception of bacteriophage activity, all that has been contended for in the past, from the time of METCHNIKOFF and EHRLICH to the time of WRIGHT, regarding active immunization. The addition of an indirect action for the phage is necessary to explain a durable acquired immunity, as otherwise it would necessitate exposure to frequent reinfection. In D'HERELLE's own words:—"The action of the bacteriophage within the body is therefore very complex: it is the primary factor in recovery and it is the indirect agency of acquired immunity." The argument really is founded on the nature of the phage. It affords the basis for curative and prophylactic treatment of disease and the explanation of death or recovery.

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* Continued from p. 342.

But this subject of the relation of the phase or stage of a disease to the bacteriophage is not yet exhausted by a consideration of death, recovery and acquired immunity. There is still the chronic disease condition to be accounted for. D'HERELLE's own explanation is that in such a case we are dealing with symbiosis between the causative organism and the bacteriophage. The organism which is entirely free from an accompaniment of phage is called "ultrapure." Acute diseases are due to ultrapure bacteria, that is, to "normal healthy bacteria which have not been parasitized by the bacteriophage, while the chronic diseases on the contrary are due to the bacterium-bacteriophage symbiosis." The conjunction results in the attenuation of the virulence of the bacterium, which, however, has contracted an immunity, a power of resistance to the bacteriophage "With the cholera vibrio," says D'HERELLE "all virulence becomes lost under these conditions." DOORENBOS (1932) claims to have settled the controversy over the relationship of the *V. cholerae* to the *V. El Tor* by showing that the latter is the cholera vibrio "contaminated" with phage. The organisms of the carrier state, for example *Bact. typhosum* causing a chronic infection such as cholecystitis, would presumably be another example of this symbiosis. "The bacillus isolated at the beginning of the acute disease is ultrapure while that found in the chronic condition has established a symbiotic relationship with bacteriophage." The various chronic diseases caused by *Bact. coli* and the chronic osteomyelitis of a staphylococcus are described as instances of this symbiosis. Not even tuberculosis is excluded. We may suppose then that chronic plague as found in rats may also be of this same category, and possibly also that the organism *Past. pseudotuberculosis rodentium* is not merely a rough variant of *Past. pestis* (ZLATOGOROFF and MOGHILEVSKAIA, 1928) but a plague bacillus in symbiosis with bacteriophage. Many instances of such possible explanation for the specific existence of some at least of the "allied organisms" which constitute any group of bacteria will occur to the reader.

Although D'HERELLE is insistent on the intestinal origin of phage, he ascribes the phenomenon of death or recovery in diseases which are not intestinal to the same agency. " Recovery in plague is the same as that in the intestinal diseases." Bacteriophage " is capable of passing into the circulation and of inducing bacteriophagy in the fluids and in the organs."

Thus we see that the theory of the bacteriophage embraces a complete and consistent theory of acquired immunity. Is natural immunity also included ?

Epidemiology and the Occurrence of Bacteriophage in Nature.

We have only to continue the hypothesis, or rather D'HERELLE's hypothesis, of the relation of the bacteriophage to disease, which we have just considered, to obtain an equally simple explanation of the phenomena of the epidemic spread of disease and the termination of that spread. The mechanism of the phenomenon may be illustrated from the case of cholera and again we quote, or adapt, the argument of D'HERELLE. Cholera vibrios are introduced into a village or a district and become distributed. An epidemic results by transmission from case to case, or by one of the commonly named agencies, water, milk or flies (D'HERELLE and MALONE, 1927). " The first cases are usually fatal. Then a patient recovers through the mechanism already discussed. From this convalescent bacteriophage, ' adapted ' to the destruction of the cholera vibrio, is spread throughout the environment and the recoveries become more and more frequent, the epidemic finally ending when the bacteriophage has become widely disseminated." Recovery is called " contagious " because it is due directly to dissemination of phage. It is evident that the spread of phage in a locality must be rapid and, within limits, it must come to be ubiquitous. According to ASHESHOV, in a hospital where phage is being administered to cholera cases " everything in the hospital—utensils, linen, hands of attendants—were harbouring the bacteriophage, which easily contaminated the newcomer." On this basis the convalescent in cholera, who contaminates well or river water, is a benefactor and not a malefactor towards his neighbours. In the convalescent, at a stage preceding actual cure, we have the cholera-destroying phage at the height of its potency, having become more or less completely " adapted " to, that is dominant over, the strain of cholera vibrio concerned in the epidemic. It takes time for adaptation to occur and during that time the epidemic spreads. From the point of view of the vibrio, not the phage, a point to be considered, which is said to be important for the continuance of an epidemic (ASHESHOV, 1931, p. 143), is whether the vibrio concerned is a " good " or a " bad " vibrio, that is, susceptible, resistant or unsuitable. In the first case phage becomes quickly adapted to it and is enhanced in virulence, whereas in the second case the phage loses its virulence. " This may explain why some epidemics quickly subside while others persist for a long time." Still another viewpoint is to be mentioned in connexion with the epidemic spread of cholera, dependent on the change in character of the vibrio which has become resistant to phage. With the development of resistance other characters alter. Such a vibrio, the vibrio of the secondary culture, whether *in vitro* or *in vivo*, may lose more or less of its virulence and so its capability of maintaining an epidemic. The course of a cholera epidemic is a struggle between vibrio and phage for dominance.

In the " plague " of the water buffalo, which has a causative organism allied to the *Past. pestis*, it is the occasional animal which may recover that disseminates a bacteriophage of enhanced potency: water buffaloes ingesting it are protected from the disease.

Some of our older epidemiological ideas regarding prophylaxis and immunity require to be re-examined in the light of the phage theory. HANKIN (1896), we may remember, contrary to all hygienic notions recommended the drinking of Ganges water in preference to well water as a preventive of cholera; this receives some support now from the phage theory, which is supposed to provide an explanation of its vibriocidal properties. Again we are familiar with the relative immunity of the Bombay rats to plague as compared with the Madras rats, an immunity which has hitherto been ascribed to the development of a resistant race of rats by a process of selection under the stress of long continued incidence of plague in the one place and its absence in the other, but which might have been a matter of the type of intestinal phage present in the two rat populations. AVARI, however, was not able to find a phage virulent for *Past. pestis* in either Bombay or Madras rats. Rats on the other hand, which had become sick and recovered from plague inoculation afforded highly potent phage from the intestinal contents and from the spleen. The occurrence of much so-called simple diarrhoea at the time of a cholera epidemic is a well known epidemiological phenomenon, and here we might expect the stools of such cases, considered to be in reality mild cholera, would furnish a cholera phage, such as is obtained from the truly convalescent cholera case. CIUCA (1923), however, could not demonstrate the existence of vibriocidal phage although the phages which were obtained showed high activity for both *Bact. coli* and *Bact. dysenteriae*. It has to be remembered, of course, that an "adapted" phage is only found at a particular stage of illness, that especially associated with convalescence, and not after actual cure. These several negative instances, then, need not necessarily be taken as opposed to the phage theory, for much depends in this theory on the dissemination of, the character of, and the time of examination for, phage. One might even speculate on the possibility of a phage which had once become "adapted" to plague or cholera remaining thereafter more easily adaptable than before to either of these diseases, even if it did revert to the ordinary intestinal type. We may refer in this connexion to the doctrine enunciated by HARVEY and IYENGAR (1928) and expressed in the phrase: "Once immunised always immunised." A wide dissemination of specific phage is especially to be expected in times of epidemic. It is to be found associated with everything, water, soil, dust and flies, which are liable to excremental contamination. Such contamination with phage should then be present at all times, but then this phage would be unadapted to the causal organism of an epidemic disease. Even on the assumption of want of adaptation it is a little difficult to account for the pronouncement of FLU (1923) that the self purification of water commonly ascribed, after EMMERICH, to protozoa is independent of the action of phage, can take place in the absence of phage and is not accelerated by the presence of phage. KHAN (1930) definitely rejects any bacteriophage agency as accounting for the vibriocidal action of Ganges water. FLU (1927) records the isolation of a phage from canal water at Leyden which was active not only against *Bact. coli* and *Bact. dysenteriae* (Shiga) but also against *Past. pestis*. One might have expected that the well waters of villages in times of epidemic cholera would have shown some evidence of the presence of phage. It is surprising therefore to learn (GRAHAM, 1930) that systematic search for the cholera phages in the well water before, during and after a cholera epidemic have been fruitless. Such are a few of the questions arising out of this discussion of the bearing of bacteriophage theory upon epidemiology and the occurrence of bacteriophage in nature, so far as they relate to cholera and plague.

Preparation and Use of Bacteriophage.

Great hopes have been raised of the therapeutic use of bacteriophage and these may still come to fruition though probably with considerable modification. According to BURNET (1930) " an active specific phage possesses all the attributes of the theoretically ideal internal antiseptic. It has no action on any living tissue, kills the invading organism rapidly and increases in amount as it does so." GRENET and ISAAC-GEORGES (1928) consider that we are already in the domain of phagotherapy for dysentery and staphylococcal affections and that we are on the point of entering this domain for plague and cholera. Unfortunately the method has not yet been sufficiently elaborated or for the matter of that critically tested to enable us to pronounce that cure or prevention in any disease has really been effected. In saying this we must be understood to refer to the direct action of phage in destroying the bacteria of disease and to exclude the immunizing action of bacteriophage lysates. Such lysates may have a distinct value as non-toxic, purely bacterial vaccines (BURNET, 1930, and LEDINGHAM, 1932, p. 469, *cit.* BUCHANAN). They have been used prophylactically in experimental plague by FLU (1929 a, b) with very considerable success and, most important, without local and general reaction. BURNET (1930 a) regards the clinical reports of the use of phage as uncritical and the results for the most part as inconstant. FLU (1923) found that phage had little effect on the self purification of water, a finding not quite in accord with HANKIN'S (1896) idea of the vibriocidal action of Ganges river water. Cholera cases were treated with phage by SOUCHARD (1930) and a mortality of 24 out of 27 resulted. These cases, however, were not treated early in the disease. SEIFFERT (1925) speaks of the bitter disappointment of the original expectations from the use of phage in infectious diseases but with a recommendation to further efforts. NOBECHI (1926 b) could not effect the disappearance of cholera vibrios from the gall bladder in carrier rabbits even after the intravenous injection of 3 cc. of bacteriophage. VIOLLE and ROURE (1925) speak of poor results in the therapeutic action of phage but do not conclude finally that it is inefficacious. A more specific bacteriophage or an auto-bacteriophage may be required. MUNTER and BOENHEIM (1925) have not obtained any certain results in the coli cystitis or the dysentery of children. Most of these trials have had no satisfactory controls with which to make comparison. TOPLEY and WILSON and again TOPLEY, WILSON and LEWIS (1925), however, used bacteriophage in a strictly controlled experiment on the spread of mouse typhoid. Their observations " do not suggest that the presence of the bacteriophage will in itself prevent the epidemic spread of infection, check an epidemic when it has once started, or appreciably reduce the mortality among the population at risk." COMPTON (1928) in a very small series of animals obtained indifferent results for experimental plague. FLU (1929 c) and Harvey PIRIE (1929) confess to little evidence in animals for prophylactic or therapeutic effect. NAIDU and AVARI (1932) seem to have had little success even with a powerful pestiphage of local origin in either animal or human plague. One would scarcely expect benefit in pneumonic plague. D'HERELLE'S own commentary on the failure of treatment of bubonic plague in India, as contrasted with his successful use of phage (4 cases) in Egypt is very interesting :—" It is possible that the differences in the results may be due to the fact that, for the cases in India, the bacteriophage employed was six or seven weeks old. But I am inclined to think that the reason for this failure is really due to the fact that the bacteriophage employed was not sufficiently potent to deal with the *strains of B. pestis in India which seem to be extraordinarily virulent*" (NAIDU and AVARI, 1927, p. 106). All workers have emphasized the necessity of using a polyvalent potent phage and for the most part use the argument of non-fulfilment of this requirement as explanation of the failures of others. TAYLOR (1930) is very emphatic that bacteriophage is "not an essential agent of recovery," and that its therapeutic administration did not influence the progress of cases of cholera, "although this phage was capable of lysing the vibrios isolated."

While we are making reference to these various trials and incidentally to the necessity for the controlled type of trial, we may note the excellent idea of D'HERELLE to establish a coefficient for each system of a disease by means of which the effect of medication may be measured. The symptoms which he takes for this purpose in cholera are : number of rice water stools, vomiting, density of the blood, cramp, collapse, anuria, pulse, and general condition. But it is advisable to pause before accepting a doctrine of inutility of treatment by phage. D'HERELLE himself has been foremost in pointing out the difficulties of phage therapy and the requirements for the success which he claims he has had. COUVY and his co-workers, LAMBERT, DUFOUR and POPOFF (1930 and 1932) report 21 severe cases of human plague with 15 recoveries and again, from a polyvalent phage, encouraging results with very little in the way of complications. A preliminary desensitization by the subcutaneous injection of the patient's own blood (autohaemotherapy) has been their routine practice to overcome the effect of anti-phage. COUVY (1932) has also insisted on a polyvalent phage in plague and that therapeutic action is a function of the lytic principle used. He affirms the perfect safety of treatment of plague by bacteriophage even by intravenous injection. Plague bacilli, which are abundant in gland juice obtained by puncture, are found to be in a state of lysis two hours after injection of phage. Some striking cases of bubonic plague have been cured in a few hours (COUVY 1932 b). " The curative action of an *appropriate* pestiphage is undoubted and rapid even in septicaemic plague." The findings of PONS (1932 b) for subcutaneous injection of pestiphage are very interesting : (1) Bacteriophage subcutaneously injected is rapidly generalized and produces in 24 hours a lysis of germs everywhere which, however, may not be complete. (2) In grave septicaemias injection of a lytic principle precipitates a toxaemia. (3) As long as lytic principle is demonstrable, cultures from either bubo or blood remain negative. (4) If during 48 hours the patient receives no bacteriophage, cultures from bubo or blood become positive, if the illness has a fatal issue, and remain negative in cases of recovery.

In the case of cholera in particular no one can afford to neglect the work and points raised by ASHESHOV (1930–32), which refer to the requirements of a therapeutic phage and to the pitfalls which beset the worker in this subject. Much of what is set out here is taken from the work of ASHESHOV.

Two characters of the bacteriophage are very liable to be confused: these are virulence and activity. Activity depends both on virulence and on the concentration of phage. Virulence is defined as an individual property independent of quantity and " can be estimated by the time in which a definite number of vibrios are destroyed by a definite number of phage corpuscles." The distinction is the usual one and applies to bacteria likewise. Virulence includes both a qualitative and a quantitative factor (BURNET, 1930a). The constant occurrence of phages of variable virulence is very important. ASHESHOV says:—" The existence of . . . races of bacteriophage of feeble virulence demands more attention in preparation of the bacteriophage cultures for practical application. It suggests the necessity of careful study of the race of bacteriophage used for that purpose. The use of 'raw' bacteriophages, isolated directly from, say, stools and mixing these direct filtrates without ascertaining the individual properties of each race used, may lead to undesirable results." Not only must we consider the potency of a phage from this point of view but also from the point of view of the bacterium. There are 'good' and 'bad' vibrios. Some vibrios when used for cultivation may yield a phage of higher virulence than do others, while some vibrios actually lead to diminution of virulence in the phage. Growth of bacteriophage on the wrong type of vibrio may bring about its denaturation. Vibrios after isolation alter very considerably and it is very essential that bacteriophage for therapeutic use should be grown on recently isolated vibrios. Grown on laboratory cultures, the bacteriophage may become, like the vibrio itself, denatured. The employment of an unsuitable phage may result in death of the phage instead of the bacterium or perhaps the establishment of symbiosis and a chronic disease. Such a chronic disease would require for its treatment a phage with virulence which exceeded that of the phage in symbiosis. Mention has been made also of anti-phage, due to the possession of antigenic properties by the phage. Such anti-phage in the blood may be a factor in the occurrence of slow cure, relapses and death (RAIGA, 1929). It was probably considerations such as these that prompted D'HERELLE to recommend the use in disease of an autobacteriophage. This, however, is scarcely possible in a rapidly fatal disease such as cholera. One of the methods recommended by ASHESHOV for keeping therapeutic phage virulent is to 'refresh' it by repeated cultivation on a freshly isolated vibrio." It is not always possible to obtain such vibrios and it takes time to determine their " goodness." Therefore a compromise may be made in the shape of cultivation of phage on the best laboratory strain available, described as ultrapure, that is not contaminated with phage, and as giving maximum virulence and maximum concentration of phage: such cultivation is to alternate with cultivation on freshly isolated strains.

As freshly isolated vibrios are so important for the upkeep of phage one may naturally ask whether it is essential to use freshly isolated phages for therapeutic purposes. MORISON (1932 b) in his recent annual report describes the procedure which he adopts in the preparation of therapeutic phage. It is that of an admixture of a large number of phages, constantly renewed. Fresh phages are obtained with certainty week by week and fresh bacteria are also procured. These are tested and at present 64 different combinations of bacteria and phage are being employed in each brew. This large number of combinations refers, however, to a phage intended for use in either cholera or dysentery. ASHESHOV, referring to the immediate use of fresh recently isolated races of phage and their replacement as often as possible, admits that the procedure is theoretically logical and practicable, but condemns it, so far as cholera is concerned, as being neither in practice. He has not so far found a freshly isolated phage, particularly of the important A type, which satisfies the requirements already set out. Moreover, even if of equal virulence, such freshly isolated phages would be lacking in polyvirulence or in stability. His method is to pass the phages, which were nurtured in the laboratory and possessed greater virulence than those freshly isolated, through human beings with cholera and to reisolate them. Now, with the administration of phage in hospital to patients, it was not very long before everything in the hospital—utensils, linen, hands of attendants —was harbouring this bacteriophage, which easily contaminated the newcomer. The stools of patients who had been thus naturally infected with the therapeutic phage were collected, to be examined for virulence. " A part of the direct filtrate of the stools containing the best races was preserved in sealed ampoules for further use and a part was subcultured only once on the vibrio isolated from the patient. Only this first transfer was used for the production of bacteriophage for field use." Preservation of phage seems to have been effected by simply sealing in ampoules, in which it has been found by test to maintain its activity undiminished for some 11 months. The chief difficulty then for practical purposes is the procural of a suitable vibrio for propagation of phage and for the preparation of bacteriophage culture. The mixture which is now used by ASHESHOV " ABC IV " for prophylactic and curative treatment of cholera contains, as it must contain, all three phages A, B and C and lyses completely an emulsion of freshly isolated smooth vibrios in not more than two hours. The lysis is permanent in the majority of cases for at least 24 hours, very often for 72. Rough strains require 3 to 4 hours for their lysis. As phage is regarded as acting only in virtue of its being a living organism, no preservative may be added to therapeutic phage. This constitutes something of a difficulty in manufacture for storage. In the attempts so far made, especially with cholera phage A, to improve virulence and to obtain a more rapid lysis a limit appears to have been reached. It would seem then that as in the case of rabies virus a " fixed virus " state may have been attained. These details have been given fully as they require to be appreciated both for experimentation with phage and for its use in practice.

The details of original isolation of phage as a pure line strain, which may be regarded as derived from a single particle, also demand some attention. One method is given by BURNET (1930 a) :—" The centre of an isolated plaque is touched with a sterile needle and the trace of material so obtained is used to induce lysis in a young broth culture of the substrate bacterium. The procedure must be repeated once or twice to ensure that the phage is pure." Another method which is also used to obtain pure phage from a mixture is that of dilution to an extreme limit and the use of the highest dilution possessing activity as presumably pure. Neither method, however, excludes the possibility of the substrate bacterium being possessed of a latent lysogenic power, that is to say of being a bacterium in stable symbiosis with phage. For the separation of phage from bacterium it may be advisable to remember and, if necessary, to use the differential action of heat. Bacteria may be killed at a temperature between 56 and 60°C., whereas " bacteriophage corpuscles are not destroyed until a temperature of 74 to 75°C. is reached."

As we began this section with the citation of instances of the use of phage, most of which were unsuccessful, we may fittingly now end it and this review by relating some of more favourable character. D'HERELLE considers that an epidemic comes to an end when the bacteriophage " contamination " becomes general. Not only so, but " experimentally we can choose a race of the most virulent bacteriophage already adapted to the rapid destruction of cholera vibrios. We can spread cultures of it over or at the very beginning of an epidemic more widely and more rapidly than is possible in the natural course of events " (D'HERELLE and MALONE 1927). It is therefore but a further step to apply these facts to prevention and treatment. In one village the epidemic of cholera came to an immediate end with the addition of 30 cc. of bacteriophage culture to the two wells supplying it with water (D'HERELLE and MALONE 1927). Most of the work in the prophylaxis and treatment of epidemic cholera has, as we have said, been done without statistically sufficient control. Such control is partially supplied in the trial, still under way, by MORISON (1932, a and b) in which two areas have been selected, one of which forms a control. In the test area bacteriophage has been supplied curatively for early cases of cholera, and by implication prophylactically for the expected following epidemic. The other area has been the control and has received no phage treatment. The results so far are all in favour of the area which has received phage. " The district has been free from cholera for a period twice as long as any during the last ten years." Five successive epidemic seasons have passed without an outbreak in the test area, while in the control area there has been an outbreak each season. The possibility, however, of a spontaneous decrease in cholera in the test area has evidently still to be reckoned with (MACKIE 1933). As an example of the therapeutic treatment of cholera, both in regard to results claimed and the detail of phage administration, we may take the account of ASHESHOV, KKAN and LAHIRI (1931) even though it is complicated by the simultaneous administration of hypertonic salt solution. That this treatment has roused the enthusiam of the authors to a very high pitch is evident and may be illustrated by their own statement that :—" We could hardly believe our own results. . . . The mortality from cholera . . . was reduced almost to nil . . . and when we say cholera we mean by it a severe attack of virulent Asiatic cholera." The bacteriophage was given undiluted in about drachm doses every 30 minutes. Two bottles, each containing 50 cc., should be finished by direct sipping in the first 16 hours. After the first 24 hours one bottle during the next 48 hours should generally suffice. For more rapid action bacteriophage may be given intravenously in 5 cc. doses, but must then be greatly diluted and is best administered with salt solution. A combined cholera and dysentery phage is likely to be useful (MORISON and VARDON, 1929) and is apparently already in use at the quarantine camp of El Tor (RUSSELL, 1932).

Commentary.

The frequency with which D'HERELLE has been quoted in this review, wherever important matters of theory and practice of bacteriophagy are involved, must not be taken as an indication of the measure of support which his views have obtained. It is true to say, however, that no satisfactory opposition has developed to those views. The particulate character of the bacteriophage and its bacteriolytic action are accepted and its inclusion among the ultramicroscopic living viruses may be taken to be at least a reasonable deduction. That the bacteriophage, if it is an organism, is a single-species organism, on the other hand, is one of the most doubtful of D'HERELLE's arguments.

The cholera vibrio and the plague bacillus are two bacteria of very different action, the one an intestinal organism and the other essentially a septicaemic organism. Bacteriophage prophylaxis and therapy have made greater advances in cholera than in plague. Much of the work with both these diseases, however, is confusing, contradictory and uncontrolled, whilst failure of prophylactic or therapeutic action of the bacteriophage is apt to be accompanied by an apologia that is complicated and not convincing. We may hope that the trials in cholera at present progressing will afford the evidence of complete and permanent suppression of its epidemic character. None the less we are of opinion that proof of favourable action, unless dramatic and continued, is most likely to be obtained by the comparison of cases alternately treated with and without phage. In view of the conflicting opinions which are prevalent regarding the living virus-nature of the bacteriophage, the only judgment, which seems to us possible on this question, is one of non-proven.

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RECENT VIEWS UPON CLIMATIC BUBO AND SOME ALLIED CONDITIONS.

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Much light has been shed upon Climatic Bubo by the observations and experimental work of recent years, not so much upon climatic (or tropical) bubo itself, as upon what has proved to be the same disease as it occurs in temperate countries—Lymphogranuloma Inguinale.

When in 1913 DURAND, NICOLAS & FAVRE described L.I. in France, they were unaware of the disease known to every practitioner in the tropics, and at that time believed, as the name implies, that the affection L.I. was related to Hodgkin's disease. Attempts to demonstrate any causal organism failed and it was not until 1930, when HELLERSTRÖM & WASSÉN showed that in the gland pulp and pus of the inguinal bubo an ultramicroscopic virus existed which could be passaged in monkeys by intracerebral inoculation, that the nature of the infection was established. The subsequent experimental work of HELLERSTRÖM in Sweden, of LEVADITI and his colleagues in Paris, of Marshall FINDLAY in London and others elsewhere, has now put us in possession of a considerable amount of knowledge concerning the virus and the tissue reactions which it excites in man and animals. LEVADITI worked with strains obtained from French indigenous cases, HELLERSTRÖM with mixed strains, while to FINDLAY we owe a comparative study of strains of virus obtained from cases of C.B. infected in the tropics with others derived from cases of L.I. whose infection was acquired in England. The published results obtained by these several workers have been reviewed in this *Bulletin* from time to time; they may be summarized as follows:—

The Virus.

C.B. and L.I. or as these two conditions may be called *Poradenitis tropica* and *Poradenitis nostras*, yield an identical virus. It is ultramicroscopic, filters through British Berkefeld filters, through Chamberland L_2 and with greater difficulty through L_3 candles. It is thrown down by ultra-centrifugation. In glycerine at low temperatures the virulence is preserved up to 10 days but lost at the end of 2 weeks. It is destroyed by heating to 60°C. for 30 minutes. It survives cooling to −2°C. or −3°C. for 10 days but is destroyed after 40 days, though it may be preserved dry in a frozen condition for 3 months. Drying *in vitro* over sulphuric acid at ordinary temperatures renders the virus inactive. Subjected to electrophoresis the virus like other ultra-microscopic viruses collects at the positive pole. The virus is present in the affected glands in man and in the sterile pus aspirated from a bubo. It may be transmitted to a number of experimental animals by suitable methods of inoculation.

Animal Experiments.

Many species of monkey are highly susceptible to intracerebral inoculation; after an incubation period of 4–8–22 days they develop symptoms of a meningo-encephalitis and show after death a characteristic pathological picture. The virus becomes generalized and can be demonstrated in the blood, liver, spleen, kidney and lymphatic glands. Monkeys may also be successfully inoculated on the prepuce and in the groin with the production of a typical inguinal bubo. The virus reaches the glands before the primary lesion on the penis develops but does not become generalized under these conditions.

Mice form the most convenient animals for experimental infections. Intracerebral inoculation gives rise after a variable period of 5–34–94 days to a meningo-encephalitis similar to that in monkeys, with general dissemination of the virus. Intraperitoneal injection is followed by general dissemination but the animals do not die of a meningo-encephalitis unless the brain is traumatized at the same time. Local inoculations have failed to produce buboes in mice. The virus will not enter the unbroken skin of the mouse but infection follows scarification. In monkeys and mice passage by intracerebral inoculations of brain-emulsions may be kept up from animal to animal of the same species or from one species to another sometimes in long series; in other cases the virus tends to die out.

Guineapigs may be infected by groin inoculation with the formation of buboes and the infection passaged from animal to animal using groin-gland emulsions as the *inocula.* The virus may reach the mesenteric glands and occasionally the spleen, liver, kidney and lung but rarely the blood and never, as far as is known, the central nervous system. The virus may survive as long as 30 days in the brain of a guineapig after intracerebral inoculation but rarely are any changes produced. In the rabbit's brain similarly the virus may persist but no symptoms are produced. Groin inoculation in rabbits is unsuccessful. The rat is insusceptible. The dog and cat may be successfully infected by intracerebral inoculation and the infection passaged.

In the blood of animals which survive their infection there may be demonstrated the presence of substances which when mixed with active virus and injected into a susceptible animal render the virus inactive. The histopathological reactions in animals are similar to those occurring in man, they are very characteristic and have been well described among others by Marshall FINDLAY. In animal lesions the inclusion bodies described by GAMNA in human gland lesions and called after him, may be seen; they are referred to by FINDLAY.

LEVADITI and his co-workers have shown that the virus after animal passages, on preputial inoculation in man will excite the production of the typical inguinal bubo.

Frei's Reaction in Diagnosis.

Second only in importance to the experimental work on animals but preceding it by some years, was the demonstration by FREI in 1925 of the development of a specific skin allergy in cases of L.I. and of a method of testing for this using as antigen a suspension of pus or gland-pulp from an accepted typical case of L.I. Upon the precautions essential in preparing the antigen and the care necessary in evaluating the results of this intracuti-reaction FREI lays great stress in a series of articles already summarized in this *Bulletin.* Properly carried out FREI's skin reaction has proved to be a specific test of great value. L.I. antigens give positive reactions in cases of C.B. and conversely the skin of an L.I. patient reacts to an antigen prepared from a C.B.

With the two methods of investigation referred to above and a growing knowledge of the clinical side of the disease as more and more cases have come to be recognized in temperate countries, L.I.

has not only awakened much interest but assumed some importance in that a much wider view of this virus infection has been unfolded, and other conditions than inguinal poradenitis appear to be due to the same infection.

The Genito-ano-rectal Syndrome.

The first to receive attention (FREI, FREI & KOPPEL) was the affection known as chronic elephantiasis and ulceration of the vulva, a chronic disease of the female genitalia for which many aetiologies had been suggested including the other venereal diseases and tuberculosis. Other cases, in which there was also associated an affection of the rectum and anus, termed by JERSILD the genito-ano-rectal syndrome were next considered and then cases in which ano-rectal disease was found alone. The last mentioned affection is perhaps best referred to as chronic inflammatory stricture of the rectum; the stricture may appear as a single entity or form part of the whole syndrome. These conditions like elephantiasis vulvae have been variously thought to be due to syphilis, gonorrhoea, etc., in the past though the evidence when examined is almost entirely fallacious. On the other hand practically all the cases which have been collected and submitted to Frei's test using an L.I. antigen have yielded positive results. In only a few have attempts been made to recover the virus in animals but they have been successful. Reference to these conditions will be made again later.

Pathological Changes.

The histo-pathological picture, whatever the lesion, whether in man or experimental animal, may be said to be the same; variations are variations not in kind but in degree, according to the activity of the virus and the stage in the process. The changes consist in a reaction on the part of the lymphatic tissues to the pervading virus for which it has an exquisite predilection. The characteristic lesion consists in tiny pin-point epithelioid formations made up of cells of macrophage type together with some giant-cells; these microscopic nodes undergo central necrosis and then contain in their centres finely granular or amorphous material; later they are invaded by migratory cells which in turn degenerate with the formation of tiny stellate micro-abscesses, the forerunner of the multiple points of suppuration so characteristic of the inguinal adenitis. The normal tissues are entirely replaced by an inflammatory tissue consisting of young fibroblasts and a cellular infiltration remarkable for its polymorphism consisting of small lymphoid cells, medium-sized monocytes, fixed connective-tissue cells, young and adult plasma cells, large mononuclears from the reticulo-endothelium, basophil granulation cells and giant cells. In later stages a replacement fibrosis occurs. These changes are characteristic of the initial lesion, of the lymphangitis and the adenitis in C.B. and L.I. They are found in the hypertrophied tissues of genital elephantiasis in the male associated with poradenitis, in elephantiasis of the vulva, in inflammatory stricture of the rectum and other tissues involved in the complete genito-ano-rectal syndrome, BARTHELS & BIBERSTEIN having been responsible for some of the most interesting work on this part of the subject.

Historical.

The chapter on Climatic Bubo must be rewritten; lymphogranuloma inguinale as a clinical entity must perforce disappear; elephantiasis vulvae and inflammatory stricture of the rectum must be rescued from the rubbish-heap of conditions of unknown aetiology. Together they must be considered as regional syndromes of a single infection, they constitute what for want of a better term at the moment I have referred to in a recent paper* upon the history of the recognition of these conditions, as a sixth venereal disease. In a monograph† published subsequently will be found a detailed review of the whole subject in all its aspects with a complete bibliography.

On the historical side little will be said here except to point out that what is probably the first description of C.B. was given by TROUSSEAU in 1865 referring to a condition among Creoles of Réunion and Maurice, and that the accounts given by a Dr. LIBERMAN, a surgeon in the French Expeditionary Force to Mexico as cited by BOURGET 1867, almost certainly have reference to the disease. In temperate countries what was afterwards called by DURAND, NICOLAS & FAVRE of Lyons lymphogranuloma inguinale had been well delineated long before, though commonly considered to be of syphilitic origin or strumous in nature. One of the best descriptions was given by William WALLACE of Dublin in 1833, others by KLOTZ of New York 1890, NÉLATON of Paris 1890 and MARION & GANDY 1901.

The attention drawn to the condition by the Lyons observers in 1913 led to the recognition of the disease in every country in Europe and in America but whereas on the continent the numbers of cases that have been reported had increased each year, no case of an indigenous infection with proof of the nature of the condition, had been recorded in this country until a case, which came under the observation of the writer in the autumn of 1932, was published.‡ Since then three cases have been recognized at the London Hospital, V.D. Clinic by Anwyl DAVIES and, in the opinion of the writer, as a knowledge of the condition spreads so will other cases be recognized in Great Britain. Inguinal poradenitis probably exists in every country in the world, though it is possible that it is localized rather to seaports and the larger cities.

Clinical Manifestations.

The contagion is usually communicated venereally but extragenital infections may occur, for example on the finger of the surgeon, and cases have been recorded in young children, including an infant 14 months old. The small papular, nodular or more commonly herpetiform primary lesion is most commonly situated in the male in the coronal sulcus but it is not so generally recognized that the initial sore may be within the urethra and give rise to an abacterial urethritis. A lymphangitis of the dorsal vessel of the penis is commoner than supposed.

Of the adenopathy little need be said here; a single big abscess in place of multiple foci of suppuration may lead to difficulty in diagnosis unless realized. Very mild cases of adenitis may be missed unless laboratory tests are employed in diagnosis. Mixed infections must never be forgotten; syphilis, chancroid, gonorrhoea and tuberculosis may complicate the case. The severity of the constitutional symptoms may be misleading. They occur generally in the earlier stages; nausea, vomiting, rigors and sweats may be marked features; a pulmonary reaction in the form of bronchitis and a meningeal reaction with intense headache and stiffness of the neck have been recorded. Prolonged pyrexia may occur and a typhoidal state supervene. The enlargement of the intra-abdominal glands may be so great as to give rise to pressure symptoms. Splenic enlargement and a generalized adenopathy have been described. Rheumatic pains and arthritis are not uncommon and associated sometimes with episcleritis. Erythema nodosum and E. multiforme are also seen.

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* *Proc. Roy. Soc. Med.* 1932. Nov. Vol 26. No 1. pp. 7–15. (Sect. of Trop. Dis. & Parasit., pp. 1–9.)

† STANNUS, H. S. A Sixth Venereal Disease. 1933. [Now in the press for publication by Baillière, Tindall & Cox, London.]

‡ STANNUS, H. S. & FINDLAY, G. Marshall, *Lancet.* 18/2/1933. p. 358.

At one time C.B. was considered a disease restricted to the male sex, and it was not till it was realized that the typical inguinal bubo occurred in cases of L.I. in women that this fallacy was corrected. In women if the initial lesion be sited on the vulva, whence the lymph flow is towards the inguinal glands, then an inguinal bubo results as in the male. It has been suggested that the gland reaction may be minimal with persisting infection about the female genitalia. Probably in the majority of cases of infection in the female the primary lesion occurs in the posterior part of the vulva or most commonly within the vagina on the posterior wall, in the lower third. Under these circumstances though some part of the infected lymph-stream may reach the inguinal glands the brunt of the infection falls upon intrapelvic glands, in them setting up changes similar to those seen in the glands and periglandular connective tissue of the groin. The course of such an infection as well as the results may be varied. The glands which are attacked appear to be those lying in the recto-vaginal septum, the ano-rectal or para-rectal glands. In some cases suppuration appears to be minimal and fistulae do not develop or form a minor part of the condition; periadenitis and infiltration of the connective tissues are marked and can be felt about the vagina and rectum; a plastic inflammation of the parametrium may fix the uterus and the adnexa may be involved. In other cases the lymph-glands undergo softening, fistulae develop which open into the vagina, the rectum or on the skin surface about the anus. The disease as in infections elsewhere may come to a natural end or the infection may persist over a very long period with the production of much more serious conditions even though the activity of the virus has become much diminished. In these chronic cases infection may spread to successive groups of pelvic glands with the production of extensive lymph-blocking. It also spreads by a retrograde lymphangitis into the connective tissues and organs whose lymph drains to these glands. The resulting conditions are therefore not merely caused by lymph stasis but are due to a specific inflammatory reaction on the part of the tissues to the virus. This has been very beautifully demonstrated by the pathological work of BARTHELS & BIBERSTEIN. Thus are produced those several conditions included under the term genito-ano-rectal syndrome, or Esthiomène, the name invented by HUGUIER who gave the first systematic description of the affection in 1848 though the first record I have been able to discover was by DESRUELLES four years earlier.

When the process is limited to the pararectal tissues, inflammatory stricture of the rectum may be the outstanding effect; in the same way the incidence may chiefly fall upon the vulva with the production of elephantiasis of the vulva; or the whole genito-ano-rectal syndrome may appear.

This part of the subject is a large one and has been very fully discussed in the monograph mentioned above; it will only be possible to make a short reference to it here. This particular type of stricture is characterized by: female sex preponderance, long history, position 2 to 6 cm. above the anus, *i.e.*, in the ampulla, most commonly at 2 or 6 cm., where the lymph plexus is best developed; the stenosis is caused by infiltration from without and not from within, the mucous membrane covering the stricture is intact and not the seat of scar tissue, but ulceration may be found below the stricture, fistulae are often present below the stricture, a polypose condition of the mucous membrane is often seen above the anus and in the region of the anus condyloma-like growths may exist, together with an elephantoid condition of the skin in the neighbourhood. The condition is really one analogous to the elephantiasis of the vulva. The process affecting the vulva may be diffuse or limited to some one part. Hypertrophy and ulceration may co-exist or either may be the more marked feature. In extreme cases with hypertrophy the labia or nymphae and preputium clitoridis may form tumours the size of coconuts covered with papillated or polypose elephantoid skin. In extreme cases when ulceration predominates, destruction of tissue may go on to the formation of a cloaca into which the remains of the urethra, vagina and rectum open.

A review of all the published cases of Esthiomène will be found in the monograph above referred to; the condition has been described in every country in Europe and in America. The first case in Great Britain was by McCLINTOCK (1863) and others were noted by the English gynaecologists WEST and BARNES. There are, so far as I have been able to discover, very few references to the conditions included under the genito-ano-rectal syndrome from tropical countries, where indeed we might expect to find them more commonly than in temperate countries. The reason lies in the fact, I believe, that for the most part they occur among natives of the prostitute class of low degree who hide their ills and, when seen, they are relegated to the category of syphilitic manifestations, and not recorded.

BRANFOOT (1902) unquestionably saw cases of esthiomène in India but confused them with granuloma venereum. I have myself seen typical cases of esthiomène in Central Africa. BOERMA and later ROEGHOLT (1926) wrote upon a rectal condition among natives of the Dutch East Indies which surely belonged to our group, and JOACHIMOVITS (1929) has given excellent accounts of the genito-ano-rectal syndrome as seen in Javanese prostitutes, though he did not recognize the cause and thought that chancroid infections played a part in causation. Inflammatory stricture of the rectum alone is probably not uncommon among certain native races. Surgeons practising in India have referred to "syphilitic" strictures as being common but it seems doubtful if they were syphilitic. JEFFREYS & MAXWELL speak of non-malignant rectal strictures as common among the Chinese. They have been noted among natives in various parts of Africa, are frequently observed in Cuba and well known among negroes in the United States. All the conditions included under the term genito-ano-rectal syndrome have, I believe, a world-wide distribution, though the number of cases, as in poradenitis, may be comparatively small.

There are many wide gaps in our knowledge of climatic bubo and those other conditions believed to be due to the same virus infection.

Further observations and records upon these affections in tropical countries are urgently needed, more especially if they can be controlled and confirmed by laboratory methods. Published and unpublished observations sent to the Bureau of Hygiene and Tropical Diseases would be welcomed.

SLEEPING SICKNESS.

LESTER (H. M. O.). **Sleeping Sickness in Northern Nigeria. A Review of Events Leading to the Adoption of Present Methods.**—*West African Med. Jl.* 1933. Jan. Vol. 6. No. 3. pp. 50–53. [12 refs.]

This paper describes the history of sleeping sickness work in Northern Nigeria, where the problems are rather different from those in other parts of Africa, owing to the fact that the country is ruled through its own Emirs and Chiefs.

During the last few years there has been a big increase in the number of cases of sleeping sickness treated in the Northern Provinces, but there can be no question that there has been a disconcerting spread of human trypanosomiasis into areas which were previously little affected. The author believes that the causes of this are due to the changes following British occupation. Previously the people tended to collect for protection into large walled towns and limited their farming to the immediate vicinity of these towns, which consequently were protected from tsetse by the large clearings around them. Following the occupation the people spread all over the country and the general population is much more exposed to fly than formerly. Similarly, the progressive settlement of the country has led to greater facilities for trade and travel. As there is no province in Nigeria free from tsetse it is clear that increased travelling has caused the disease to spread to areas previously free from sleeping sickness.

There follows a brief history of sleeping sickness in Northern Nigeria up to 1921, when JOHNSON and LLOYD were appointed to investigate the tsetse fly problem in Northern Nigeria. From this date onwards there has been a progressive increase in the number of cases treated. In 1926 some 298 cases were treated mainly with tryparsamide. In 1927, 364 cases were treated at Sherifuri and 82 at other stations. Towards the end of this year four sleeping sickness officers started work, and in 1928 they treated no less than 3,012 cases, whilst 82 cases were treated by the rest of the medical staff. As the result of JOHNSON's journey across Africa to observe methods of trypanosomiasis control in various Belgian, French and British Dependencies, he recommended that there should be a re-organization of the Tsetse Investigation Staff, and that provision should be made for the compulsory treatment of natives where necessary. These recommendations could not be put into practice before 1930. In 1929, the sleeping sickness staff treated 3,629 cases. Although this was a big improvement matters were still far from satisfactory, because the majority of patients received only 2 or 3 injections of tryparsamide and soon relapsed. It was then decided that every effort must be made to persuade patients to attend for a full course of treatment. In 1930, 3,377 cases were treated and a fair proportion of these received a full course of tryparsamide. In addition, a further 1,857 cases were treated by the general medical staff.

The author then passes to a consideration of the French method of sleeping sickness control and the possibility of the application of the French methods to Nigeria. The Nigerian system of indirect rule made it necessary for these methods to be modified before they could be applied in Nigeria. In the French Colonies the sleeping sickness team was accompanied by a force of Native Police, who used direct measures to enforce the attendance of the whole population for examination and treatment. This cannot be done in Nigeria, and it is obvious that here the one hope of success lies in the active co-operation and support of the Native Administrations. In a later paper it is hoped to give a detailed description of the methods which had been adopted in carrying out a mass examination in a Hausa Emirate.

For the greater part of 1931 it was only possible to have one team at work in the field, but towards the end of the year a second team was appointed. Up to September, 1932, these teams have treated about 10,000 cases. *W. Yorke.*

LESTER (H. M. O.). **Report of the Tsetse Investigation.**—*Nigeria Rep. on the Med. & Health Dept. for Year 1931.* Appendix B. pp. 89–98.

The first part of this report deals with laboratory work carried out at Gadau.

The work on the nature of certain trypanosome strains isolated from sleeping sickness patients has been continued. The Gadau strains 1 to 5 are comparatively avirulent in laboratory animals, whereas strain Ayu 6, the local strain 6 and an old London strain were all very virulent. Strain Ayu 6 is completely resistant to tryparsamide, while two others, viz., Gadau 1 and 6, exhibited a considerable degree of resistance to this drug.

The author writes that it seems to be very significant that 3 of 10 strains tested show a natural resistance to tryparsamide in small laboratory animals. Strain Gadau 4, which was originally very sensitive to tryparsamide, was made arsenic-fast; it was not possible to discover whether this acquired character could be transmitted by the fly, because all attempts at transmission failed, probably because the strain had become non-transmissible during the necessary manipulation. On the other hand, strain Ayu 6 was found to be tryparsamide-resistant after passage through *G. morsitans*, though in this case it is probable that the arsenic-resistance is a natural as opposed to an acquired character.

In vitro tests were carried out with all these strains. It was found, whereas Gadau strains 1 to 5 and Ayu 5 were all completely insensitive to human serum, strains Ayu 6, Gadau 6 and the London strain were all killed in under 3 hours. The author concludes that the strains Ayu 6 and Gadau 6 had many of the characteristics usually ascribed to *T. rhodesiense*, while Gadau 2, 4, 5, and Ayu 5 resembled the classical *T. gambiense*. Three strains Gadau 1, 3, and Ayu 5 (*sic*) had intermediate characters.

Cerebrospinal fluids from sleeping sickness patients were examined by the bi-coloured guaiac test and the findings controlled by a white cell count. The curves were of the flat or plateau type very similar to that found in general paralysis.

Work on the transmissibility of *T. gambiense* strains by *G. tachinoides* has been continued. DUKE's findings in East Africa have not been confirmed for these Nigerian strains, as, when reasonably large numbers of flies were employed, all the strains examined proved to be cyclically transmissible by tsetse.

The next part of the report deals with the field work. The results so far obtained on "trapping" have not been encouraging. During the year some 5,000 cases of sleeping sickness have been treated and practically all cases have been given a full course of 20 to 30 gm. tryparsamide.

Details are given of the work of the sleeping sickness staff and information is supplied concerning the districts found to be infected.

The last section of the report deals with the treatment of sleeping sickness cases in the Jemaa and Jos Divisions.

Interesting information is given regarding the re-examination of sleeping sickness patients in Ayu District. Out of a total of 172 cases diagnosed in April, 1931, there were 7 deaths, leaving 165 who attended for treatment. Treatment with tryparsamide (24 gm. per adult) was given in June and July. In November, 155 were re-examined for enlarged glands and the presence of *T. gambiense* in the gland juice and blood. The great majority showed either no glands or small firm glands as the result of treatment. The spinal fluid was re-examined in 84, a large number of cases with original normal cell counts not having their cerebrospinal fluid re-examined. The results are given in the following table :—

Groups.	Treatment.	Original cell count.	White cell count in C.S.F. after Treatment.					Total cases.
			Normal.	Reduced.		Unchanged.	Increased.	
				Greatly.	Slightly.			
1	Full course	Increased	26	10	5	5	1	47
2	Full course	Normal	7	...	...	...	...	7
3	2 inj. ...	Increased	15	1	...	1	1	18
4	2 inj. ...	Normal	7	...	...	...	2	9
5	Nil ...	Increased	...	...	...	...	2	2
6	Nil ...	Normal	1	...	...	...	...	1
								84

The author remarks that the greatest interest attaches to Group 3, who had only two injections of tryparsamide, and who originally had increased cell counts ; 15 out of the 18 were apparently cured by this small amount. *W. Y.*

ZSCHUCKE (Johannes). Beitrag zur Kenntnis der Schlafkrankheit in den westafrikanischen Küstengebieten. [**Sleeping Sickness in the West Africa Coastal Region.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1932. Nov. 29. Vol. 114. No. 3. pp. 464–500. With 7 charts. [61 refs.]

The author states that he went to Spanish Guinea in 1928 with two main objects in view : firstly to compare sleeping sickness in West Africa with that found in East Africa, and secondly to subject to a systematic test certain new trypanocidal remedies and to contrast their action with that of other well-known drugs.

The first portion of the paper relates to general manifestations of the disease. He reached the conclusion that the so-called trypanosomal chancre is probably always present in European cases of sleeping sickness contracted in West Africa, but that it is never seen in native cases either in West or East Africa.

In West Africa the disease in the European is characterized by an intermittent fever which runs an irregular course; this is seen in East African natives and often in natives of the Cameroons, but rarely in the Coast natives at Fernando Po. In a table the author summarizes the signs exhibited by 218 cases (104 early and 114 late) of sleeping sickness in West African Coastal natives. The frequency of clinically latent cases of sleeping sickness amongst Coastal natives appears to be associated with the scantiness of the trypanosomes in the blood, lymph glands and spinal fluid.

In view of the fact that there are often very few clinical symptoms and that search for the parasite is often in vain, the questions of diagnosis and therapy are frequently matters of difficulty. The author consequently devoted much attention to discussing the various haematological, serological, and other aids to diagnosis.

The following summary is given:—

Trypanosomiasis of the West African Coastal native is to be distinguished from that of East Africa and especially from that of Europeans by the absence of the trypanosomal chancre, by the rareness of skin and general signs, and by the paucity of parasites in the blood, lymph glands, and cerebrospinal fluid. Among the nervous symptoms, the spinal manifestations outweigh the cerebral, and among the psychical anomalies, psychomotor inhibition is more pronounced than is psychomotor excitation.

These observations are considered to be an expression of a change in the character of the disease, not so much because the virus has possibly become attenuated in the course of a century, but because the West African people, thanks to natural selection, have gradually become resistant to the trypanosome and because this resistance has inhibited the generalization of the virus and the allergic re-tuning of the whole organism.

On this hypothesis there arises a new viewpoint for therapy and explanations of the divergencies of opinion regarding the most important of the therapeutic agents hitherto discovered.

Consideration of the various laboratory methods for the diagnosis, prognosis, and therapy of sleeping sickness has shown that haematological and serological methods are generally of little value, but that examination of the cerebro-spinal fluid, especially by colloido-chemical methods, is very useful. *W. Y.*

UGANDA PROTECTORATE. **Annual Report of the Human Trypanosomiasis Research Institute for the Year ended 31st December, 1932** [DUKE (H. Lyndhurst), Director].—10 pp. 1933. Entebbe: Govt. Printer. [Sh. 1.]

Owing to the fact that the Human Trypanosomiasis Research Institute at Entebbe no longer receives financial support from the other East African Colonies, its income during 1932 was reduced from £9,000 to £4,500 per annum. This has necessitated the reduction of the European staff to a Director, Bacteriologist and Laboratory Assistant. Late in January, 1932, the old laboratory was vacated and possession was taken of the new laboratory building. Owing to the lack of funds half this building at present stands idle, devoid of all internal fittings, and the floors, walls and ceiling unfinished. A brief description of the new laboratory is given.

During the year 4 safaris were undertaken. In May Dr WALLACE visited the *morsitans* belt of Mbarara, and later the *pallidipes* area on the Busoga coast line; DUKE himself visited Damba Island in February, and in August he went to the Ngussi River.

In August some alarm was occasioned by the discovery near Kampala of several cases of a very acute form of human trypanosomiasis, the sufferers being in one or two cases picked up comatose by the roadside. The trypanosome concerned was found to be *T. rhodesiense.* The patients came from the Buzinza country over the Tanganyika border, where human trypanosomiasis was unknown until the appearance of these cases in Uganda. Measures have now been begun to check the introduction into Uganda of this highly undesirable trypanosome. In Duke's opinion the danger was very real, as *G. morsitans* is found along Uganda's south-west frontier, and miles of *palpalis* shoreline lie open to invasion on the Sesse Islands and the adjacent mainland. It is noted that the strains from these Buzinza cases are found to be readily transmissible by *G. palpalis* in the laboratory.

The remainder of the report is concerned with summarizing the scientific work done at the laboratory during the year. This has for the most part already been published and noticed in this *Bulletin.*

W. Y.

KELLERSBERGER (E. R.). **African Sleeping Sickness. A Review of 9,000 Cases from a Central African Clinic.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 211–236. With 15 figs. [21 refs.]

This article gives a very interesting account of the author's work on sleeping sickness, its symptomatology and treatment at the Bibanga Mission in the Katanga Province of the Belgian Congo.

A hospital with about 200 beds was completed in 1923. Between this date and 1932 approximately 30,000 patients have been registered, and of these about 9,000 were suffering from trypanosomiasis. All were of the *T. gambiense* type and were infected by *G. palpalis.* As far as possible all cases were followed up for two years or more after treatment, and considering the primitive nature of the people a remarkably large proportion (75 per cent.) has been observed over a long time. Over 400 died in hospital, death being due either directly to advanced disease or to an inability to take drugs, but more often from complicating diseases. A small percentage was lost sight of and another small group did not finish treatment; undoubtedly many of these died. The mortality was much increased by the fact that many cases were brought to the hospital far advanced, often after having been abandoned by their people.

In most cases diagnosis was made by blood smear, gland puncture, or lumbar puncture. Only in advanced cases was it difficult to find the parasite, and here clincial symptoms were usually so pronounced that diagnosis was simple. The patients were classified into three categories.

The first consisted of those in good health with trypanosomes in the blood stream. Very early cases were rarely encountered, as very few natives reported for examination at this stage and the infection was only discovered accidentally. The author writes that symptoms do not appear for several weeks after infection. Some months later, the lymphatic glands become enlarged. The patients belonging to this group mostly presented themselves because of attacks of remittent fever, or chronic headaches, or general ill health.

The second group includes those who showed definite clinical symptoms—swollen glands in the neck, constant headaches, or irregular fevers; others complained of sexual impotence, or miscarriage, or sterility. There is often the telltale expression, " a certain intangible, swollen, stupid look that one finds only in this disease." Nervous symptoms, such as tremors, slurred speech, mental dullness, also appear. In this group trypanosomes were seldom found in the blood, but were almost always discovered by gland puncture. This group represents the largest number and contains about 75 per cent. of the author's cases.

The third group is really an advanced second group. It is the most discouraging and difficult of all. Many die in their villages, ostracized or abandoned by their people. They spend hours in stuporous sleep, or are driven into the forest by their mania, to perish miserably from hunger or exposure, or to fall victims to a wild beast, or to an army of driver ants. A very graphic description is given of the symptoms and signs exhibited by this group of patients.

Four drugs were used by the author, viz., atoxyl, antimony, Bayer 205, and tryparsamide. He agrees with CORSON and others that in early cases Bayer 205 is the best drug, but, unfortunately, most cases do not come early enough. He is convinced that with *T. gambiense* infections, all later cases, i.e., with central nervous system involvement, finally relapse after Bayer 205. Undoubtedly the most useful drug for his work was tryparsamide, and since 1925 this drug has been given to nearly 8,000 cases. The routine procedure is now a series of weekly injections, each dose being 0·045 gm. per kilo. of body weight.

The author further considers that in all cases where the central nervous system is involved, a second course should be given after a rest period varying from 1 to 3 months, according to the condition of the patient. Experience shows that the drug can be continued over long periods and as much as 100 gm. have been given in a course. When in doubt a second course is given, though many cases are cured by only one series of injections.

At the end of this very interesting report details are given regarding nine cases treated with tryparsamide. Some of these cases were apparently cured by a single course of the drug, whilst two of them, viz., Case 712 and Case 116, received two or three courses. Unfortunately, from the data supplied, it is by no means certain that Case 712 was not cured by the first course, and Case 116 by the second if not the first. Case 712 is particularly interesting. Before treatment in August, 1926, lumbar puncture showed 1,800 cells, and the patient was unbalanced mentally. After 8 injections totalling 20 gm. of tryparsamide, lumbar puncture showed only 48 cells : three months later a second course of injections was given, and subsequent lumbar puncture showed 24 cells. A year later, without any further treatment, lumbar puncture showed 10 cells, and two years later than this, again without treatment, lumbar puncture showed two cells ; three years later the patient was still in excellent health.

[It seems to the reviewer very doubtful whether the patient was not cured by the first course, and that the spinal fluid might well have become normal without a second course. The point is of importance. It is frequently stated in the literature that a number of courses of tryparsamide are often necessary to effect a cure, but the evidence that this is a fact is usually most unsatisfactory. In the reviewer's experience with experimentally infected rabbits if the first course fails to effect a cure further courses are useless. The reason for this is perfectly clear ; rabbits which are not cured by the first course develop resistant strains of trypanosomes.] *W. Y.*

DYLEFF (P.). Quelques réflexions sur la disparition spontanée des trypanosomes chez trois européens reconnus porteurs des trypanosomes. **[Spontaneous Disappearance of Trypanosomes from Three Europeans.]**—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 956–958.

Details are given of three Europeans in whom trypanosomes were found and whose blood subsequently became negative without treatment and remained so for prolonged periods.

The blood of four Europeans was examined for trypanosomes, by the triple centrifugation method, at the Consortium Minier Congo Niari, Mindouli, on the 15th February 1932. In two of the four trypanosomes were found. The patients, who showed no signs of the disease, were sent to Brazzaville—a 4 or 5 hours' journey by motor car. They were examined at Brazzaville immediately after their arrival with negative results. A week later they were again examined with negative results. One of the patients was then sent to France and examined by MESNIL, again without success; the other elected to remain under observation at Brazzaville and 9 or 10 blood examinations (triple-centrifuge) have all been negative.

The details of a third case discovered in the same locality 29th February 1932, are very similar. *W. Y.*

ECONOMIC ADVISORY COUNCIL. **Tsetse Fly Committee Report. Developments in the Treatment of Animal and Human Trypanosomiasis and in Tsetse Fly Control in the Period 1925–31** [PLYMOUTH, Chairman].—27 pp. 1933. London: H.M.S.O. [6d.]

The Tsetse Fly Committee was appointed in 1925 and naturally its first duty was to consider a plan of procedure for a campaign to control the conveyer of trypanosomiasis. In October of that year their first report was presented to the Committee of Civil Research (now the Economic Advisory Council), putting forward certain recommendations as to what ought to be undertaken in each of the East and West African territories. They expressed the view that local control was primarily the function of local administrations and that the cost of such should fall on the respective Governments, but that research should be under the direction of a Permanent Trypanosomiasis Committee. The latter recommendation not meeting with general acceptance, it was decided that the Tsetse Fly Committee should carry out the functions of the proposed Trypanosomiasis Committee, but in an advisory capacity only.

The report proper on the six years' work, 1925–31, is divided into four sections:—

1. *Developments in the Treatment of Animal Trypanosomiasis*, with subsections on the species of trypanosome present (*T. brucei* causing nagana in horses and dogs, *T. congolense* and the less virulent *T. vivax* infecting cattle), variations in course of the disease (depending on the number of infecting flies, the species of parasite in relation to the host, and the important question of latent or dormant infection, immunity-tolerance or premunition), the methods of diagnosis (as by provocative injection of halarsine, or of antimosan, by animal inoculation, complement fixation and the adhesion phenomenon, of which the penultimate would seem to be the best), on chemotherapy (especially with naganol and certain antimony compounds) and on

measures of control (as by genetic means—suitable crossing with immune native cattle—by isolation, by dipping, by chemical prophylaxis and attempts at immunization).

2. *Developments in the treatment of human trypanosomiasis,* by Bayer 205 and Tryparsamide, separately and in combination, for cure or prophylaxis [the tests with the styryl compounds are not referred to].

3. *Development of measures for control of tsetse flies,* by reclamation, by grass fires, strip-clearings, game and fly barriers (planting broad strips of dense thicket in which cattle tsetses as *G. morsitans* and *G. swynnertoni* cannot live), by catching of flies by hand or trap. This section ends with a brief sketch of the results attained in Shinyanga and Mwanza (Tanganyika), in Sherifuri and Matyoro lakes region (Nigeria).

Lastly is a short section giving the Committee's conclusions as to the results obtained in each of the three fields dealt with in the preceding sections.

The whole subject, especially regarded from the scientific aspects, was considered in much greater detail in the publications on Medical Research in the Colonies, Protectorates and Mandated Territories, issued by the Colonial Medical Research Committee (which was dissolved in 1930) in 1928, 1929 and 1930. In these were discussed for each Colony in turn, the situation at the time, the researches in progress, the measures attempted or adopted and the results. These publications were issued for official distribution and several copies were sent to each Colony and to each worker in this field who was thus made acquainted with progress elsewhere also.

In the space here available these details cannot be adequately given, but the general situation may be gathered from the concluding observations of the Committee from which the following is taken :—

" (*a*) Treatment of animal trypanosomiasis.

" The period under review has been marked by progress in the recognition of the nature and complexity of the problem presented by animal trypanosomiasis, and this has been accompanied by a considerable advance in regard to the fundamental question of diagnosis. Of special importance has been the recognition of the part played by latent trypanosomiasis in increasing the losses connected with rinderpest immunisation, especially in West Africa, and the successful application of measures to eliminate or minimise this factor. Drug treatment has also made considerable progress. In the camel trypanosomiasis of the Sudan, improved methods both of diagnosis and treatment have now made it possible for the disease to be attacked with a very considerable degree of confidence. In the trypanosomiasis of cattle, the action of antimony compounds has been further studied and methods of administration improved and standardized. . . . This treatment . . . is rendering . . . possible agricultural and mining developments that otherwise could be carried through only with great difficulty. The success that has been attained has, however, emphasised the need for the prosecution of further research on the widest practicable scale.

" (*b*) Treatment of human trypanosomiasis.

" Work on human trypanosomiasis in recent years shows that germanin (Bayer 205) if given in the early stage of infection by *T. gambiense* is curative, but that in *T. rhodesiense* infection, the results are less certain. . . . The present tendency in British territories in Africa is to give first germanin and later a course of tryparsamide, and this is probably the best form of treatment in cases in which it is impracticable to ascertain the state of the spinal fluid by lumbar puncture The value of germanin for the prevention of sleeping sickness in a native community is not yet satisfactorily established

"(*c*) Tsetse fly control

"The Report shows clearly how serious is the tsetse fly menace in many parts of Africa Over large stretches of territory no economic progress will be possible until this problem has been successfully tackled, and even in areas that are at present settled there is often a danger that an advance of fly may take a heavy toll both of human life and of the livestock on which the native largely depends for his existence In extreme cases there may in present conditions be no alternative to the evacuation of the population and the surrender of territory to the fly

"Research for improved methods of tsetse control, far from being of academic or scientific interest only, is thus a problem of great urgency and practical importance to many of the colonial administrations in Africa"

"The most important work has been that carried out under Mr Swynnerton's directions by the Tsetse Research Department of the Tanganyika Territory This has brought within measurable distance the practical solution of many aspects of the tsetse problem It is thus in the truest sense of the term pioneer work of the utmost value to every country where tsetse flies occur The Committee trust that, notwithstanding the present financial stringency, every effort will be made in this and following years to provide the funds necessary for the continuance of this work, the successful conclusion of which is vital not only to Tanganyika, some two-thirds of the area of which is under fly, but also to other fly-infested territories in Africa" *H H S*

DUKE (H Lyndhurst) **Studies on the Factors that may Influence the Transmission of the Polymorphic Trypanosomes by Tsetse. I. A Review of Existing Knowledge on this Subject, with Some General Observations. II. On the Transmitting Power of Different Races of** *Glossina* **III.** *Glossina morsitans* **versus** *Glossina palpalis* **as a Transmitter of the Polymorphic Group of Trypanosomes.**—*Ann Trop Med & Parasit* 1933 Apr 10 Vol 27 No 1 pp 99–118 [19 refs], 119–121, 123–130

A study of the factors which influence the transmission of the polymorphic trypanosomes by tsetse and firstly of the transmitting power of different races of fly and a comparison of the transmitting power of *palpalis* and *morsitans*

The author summarizes his first paper as follows

"1 A consideration of the results of the dissection of wild tsetse by a number of observers in different parts of Africa suggests that the adjustment between the mammalian trypanosomes and the tsetse upon which they depend in nature is not very close Of the pathogenic mammalian trypanosomes, the proboscis-only group, comprising *T vivax* and its allies, is almost always the most widely distributed in wild tsetse, and the polymorphic group is the least successful

"2 In theory, transmission experiments with laboratory-bred tsetse should yield a higher infection rate than that obtaining in wild flies Table II shows that the carrying power of the tsetse, under what appear to be abnormally favourable conditions, rarely exceeds 20 per cent when an adequate sample of flies is taken

"3 There are indications that the full carrying capacity of a given tsetse population in nature may often remain untested owing to the prevalence in the area of food animals that are unsuitable hosts for the trypanosomes that depend upon the tsetse Baboons and large reptiles, possibly elephants and probably hippo and wild pig fall into this category of food animals

"4. There are indications that only a certain limited number of individuals of any tsetse population are able to act as hosts for trypanosomes. The existence of double infections of the same fly with two different species of trypanosome supports this conclusion. These gifted individuals appear to constitute but a small proportion of a fly population and to be suited to all species of trypanosomes that can develop in tsetse, whether mammalian or reptilian. It is probable that species and also strains of trypanosomes differ in their ability to utilise these potential carriers.

"5. The indications in favour of climate being an important factor in determining the infection rate are not at all clear. More experimental and field work is required on this subject.

"6. There are indications that *G. pallidipes* may in certain circumstances attain a relatively high standard of efficiency as a carrier of the pathogenic mammalian trypanosomes. Whether this is determined by climate, or by the racial peculiarities or the feeding proclivities of this fly, cannot yet be determined.

"7. Unilateral infections of the salivary glands have been shown to occur in both *G. morsitans* and *G. palpalis* in flies dissected during laboratory transmission experiments.

"8. It has been shown that *G. morsitans* in nature may be infected with a trypanosome of the *T. grayi* type, an observation which strongly suggests that this species of tsetse on occasion feeds on reptiles in nature."

II. This paper relates to an experiment devised with the object of ascertaining whether different races of tsetse from different localities differ appreciably in their susceptibility to infection with trypanosomes. *G. palpalis* were obtained from two sources, viz.—(1) Mainland flies at Nakiaga, and (2) Damba flies. Pairs of boxes, each box containing some 50 flies from one of the two localities, were fed twice, with a day's starvation between the feeds, on a monkey carrying a trypanosome known to be transmissible by *palpalis*. *T. gambiense* and *T. rhodesiense* were the trypanosomes used. The results of the experiment are summarized in a table, and show very striking agreement between the two groups of flies.

III. In this interesting paper the author has investigated the question whether the transmitting power of *G. morsitans* and *G. palpalis* is the same. He summarizes his results as follows:—

"1. Evidence has been produced to show that *G. morsitans* is a more efficient vector of the trypanosomes of the polymorphic group than is *G. palpalis*.

"2. Of a total of 3,119 *G. morsitans*, 203 (6·5 per cent.) were found on dissection to contain flagellates. Of a total of 3,236 *G. palpalis* treated in exactly the same manner, 95 (2·9 per cent.) contained flagellates. Of these grand totals, 881 flies of each species belonged to the experiments of Kleine and Fischer.

"3. Although the carrying power of *G. morsitans*, as revealed by these experiments, appears to be almost twice as great as that of *G. palpalis*, even the former species, in the conditions of experiment prevailing at Entebbe, is but poorly adjusted to the requirements of the polymorphic group.

"4. A strain of *T. gambiense*, judged to be non-transmissible by *G. palpalis* as the result of testing with several thousand flies, when tested by *G. morsitans* proved also non-transmissible by this species." *W. Y.*

CORSON (J. F.). **A Note on Some Experiments on the Action** *in vitro* **of Normal Human Serum on** *Trypanosoma brucei* and *T. rhodesiense*.—*Jl. Trop. Med. & Hyg.* 1933. Feb. 15. Vol. 36. No. 4. pp. 53–55.

This paper records experiments bearing on the question whether trypanocidal activity *in vitro* of serum is connected with the animal's resistance to infection. Three strains of trypanosomes were used, viz., a strain of *T. brucei* from Natal, a strain of *T. brucei* from Tanganyika, and a strain of *T. rhodesiense* also from Tanganyika.

The Natal strain of *T. brucei* infected only about half the rats inoculated at one time and failed to infect guineapigs ; it also failed to infect four European volunteers. The Tanganyika *T. brucei* never failed to infect rats, but guineapigs were resistant, although not quite immune. The *T. rhodesiense* strain was obtained by injecting rats with the cerebrospinal fluid from a human being ; and of the two rats inoculated, only one became infected.

The object of the experiments was to ascertain whether guineapig serum had any trypanocidal action on the Tanganyika *T. brucei* ; if the serum of a rat which had previously resisted infection with *T. brucei* in Natal was trypanocidal to it ; and if the strain of *T. rhodesiense* freshly isolated from man was resistant to human serum, previous experiments having shown that freshly isolated strains of *T. rhodesiense* were more resistant to human serum than strains which had been maintained in sheep and goats for several months after isolation from man. The technique employed was based on that of YORKE, ADAMS & MURGATROYD (1930). The results, which are summarized in a table, show that the guineapig serum had no apparent trypanocidal action on *T. brucei*, Tanganyika, and that the serum of the resistant rat had also none on *T. brucei* Natal. Both strains of *T. brucei* were susceptible to normal serum as was also the strain of *T. rhodesiense*. *W. Y.*

JOHNSON (P. D.) **A Case of Infection by *Trypanosoma lewisi* in a Child.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Mar. 23. Vol. 26. No. 5. pp. 467–468. With 1 chart.

In this very interesting note details are given of an instance of infection of a human being by *Trypanosoma lewisi*.

The patient was a Sikh child born in Batu Gajah Hospital, Federated Malay States, on the 5th April, 1932. A week later the child was taken to its father's house, which was a rat infested dwelling. It is stated that the rats ran over the children's beds and ate any food that was not locked up. On August 22nd the child was re-admitted to hospital with a history of lassitude and loss of appetite for three weeks, and fever for ten days. The child was very anaemic ; the liver and spleen were not palpable ; the blood was negative for malaria parasites, but was heavily infected with trypanosomes which had the typical appearance of *T. lewisi*. The parasites persisted in the peripheral blood for five days, but from the 6th day onwards blood films were negative. The fever subsided coincidentally with the disappearance of trypanosomes from the blood.

It is remarked that blood films were sent to Professor THOMSON and to Dr. WENYON, who both stated that the trypanosomes on the slide in question were *T. lewisi*. Attempts to convey the infection to rats and guineapigs, after its passage through the child's blood, proved unsuccessful. *W. Y.*

GREIG (E. D.). **Notes on Recent Cases of Trypanosomiasis** (*T. gambiense*).—*Jl. Trop. Med. & Hyg.* 1933. Jan. 16. Vol. 36. No. 2. pp. 23–24.

Details are given of a case of sleeping sickness—the wife of a missionary in Southern Nigeria—who, although very ill, was admitted to hospital in

Edinburgh and made an excellent recovery as the result of combined therapy consisting of 5 gm. of Bayer 205 and 25 gm. of tryparsamide.

W. Y.

HISSETTE (J.). Considérations pratiques sur des accidents oculaires de la trypanosomiase ou de son traitement. [**Eye Symptoms in Trypanosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 531–538.

This article considers the eye changes met with in human trypanosomiasis and their bearing upon treatment.

Among the external complications are (1) a benign endocyclitis, (2) a diffuse interstitial keratitis, (3) conjunctivitis with secretion, and (4) oedema of the lids without renal or cardiac disease. The first two conditions seriously interfere with vision, especially if they are bilateral. Evidently then, when a sleeping sickness patient complains of his sight, it is necessary to examine the eyes carefully, as failure to do so may wrongly cause suspension of treatment. It is not necessary to be able to distinguish trypanosomal interstitial keratitis from that due to syphilis, leprosy or onchocerca, but it is necessary to realize that the loss of vision is due to an external trouble and not to a nerve lesion.

Turning to the complications of the posterior portions of the eye and optic nerve there have been described a form of choroiditis (Treacher Collins) and a pigmented choroidoretinitis ; both these are rare. The most important are undoubtedly the different kinds of atrophy of the optic nerve. These are two : (1) a primary atrophy, and (2) a secondary atrophy. The clinical signs of these are identical with those of the atrophy due to arsenical poisoning. It is important, therefore, when a diagnosis of sleeping sickness is made, not to forget to examine the visual acuity of each eye separately. The examination of the visual field, the value of pupillary reflexes, etc., and the ophthalmoscopic appearances are matters for the specialist. Much valuable information could be obtained from a carefully ascertained history, but in the case of Africans this necessitates a knowledge of the language, which is well-worth acquiring by those engaged in treating natives.

In the author's experience optic atrophy as the result of tryparsamide, or the Belgian equivalent tryponarsyl, is very rare, provided the drug is given as recommended by VAN DEN BRANDEN. If careful examination of the eye suggests that this is occurring, the arsenical must be stopped and tartar emetic given. The author considers that it is important to examine the patient carefully for dysentery and worms, and to prohibit alcohol and tobacco, because not only may these produce analogous conditions, but they may aggravate the toxic action of arsenicals.

Hissette then passes to a consideration of eye changes which may result from Onchocerca. These changes evolve slowly, and the patients almost always exhibit volvulus cysts ; they often manifest themselves as a kerato-conjunctivitis or as a punctate keratitis. In other cases, however, these signs are absent and the lesions are confined to the posterior segment of the eye ; there may be atrophy with pallor of the disc, or the trouble may be retro-bulbar. Arsenical atrophy sets in rapidly, whilst retrobulbar trouble due to Onchocerca develops very slowly.

In conclusion, the author remarks that he has used tryponarsyl extensively in the treatment of trypanosomiasis, according to van den

Branden's method, and that among more than 2,000 patients he has had only one case of partial atrophy in one eye. The cases of complete optic atrophy seen by him were generally produced by atoxyl.

W. Y.

WORMALL (Arthur). **Carbohydrate Metabolism in Human Trypanosomiasis.**—*Biochem. Jl.* 1932. Vol. 26. No. 6. pp. 1777–1787. [29 refs.]

After summarizing briefly the literature relating to carbohydrate metabolism in experimental trypanosomiasis, the author points out that so far no observations appear to have been made on the blood-sugar changes in human trypanosomiasis. The present paper records observations on the resting blood sugar values and the sugar tolerance for natives with trypanosomiasis and the values for normal natives. The observations are set forth in a series of tables.

The following summary is given :—

" 1. In view of the findings of various authors, that in trypanosomiasis of small animals there is a significant hypoglycaemia, which according to some is partially, if not entirely, responsible for the decline of the host, repeated blood-sugar determinations have been carried out on 12 sleeping sickness patients in Uganda (*T. gambiense* infections).

" 2. Determinations carried out with these patients and with suitable controls (natives not suffering from trypanosomiasis) over varying periods of time indicate that in man there is no general hypoglycaemia during the earlier stages of this disease. In certain instances, however, a definitely low blood-sugar value was obtained, these low values being significantly lower than the lowest value with a normal native.

" 3. Treatment of these patients with Bayer 205 gives variable results in relation to the blood-sugar ; sometimes there is a fall, sometimes a rise, and in other cases no change in the blood-sugar level. With the patient with the lowest blood-sugar values, the injection of 1 g. Bayer 205 resulted in a speedy return to normal (or perhaps slightly high) values.

" 4. No relationship could be demonstrated between the blood-sugar level and the presence in or absence from the blood of trypanosomes.

" 5. Glucose tolerance tests carried out on a few of the patients and some of the controls do not suggest that in trypanosomiasis there is a very marked impairment of the capacity of the liver to deal with glucose. *W. Y.*

LAURENT (R.). Remarques à propos de l'action du traitement par la tryparsamide, sur la lymphocytose du liquide cephalorachidien, au cours de la trypanosomiase. [**Effect of Tryparsamide on Lymphocytosis of the C.S.F. in Trypanosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 539–544.

The author records his observations on the effect of tryparsamide treatment on the lymphocyte count of the cerebrospinal fluid in a large number of cases of sleeping sickness. The work has been carried out at Lomami since 1931.

With very few exceptions tryparsamide was the only drug given. The standard-cure consisted of 30 gm. of tryparsamide (tryponarsyl Meurice) given in 15 weekly doses of 2 gm. Lumbar puncture was done before and after treatment. Patients in whom the spinal fluid was normal 2 to 3 months after treatment were considered as apparently cured, but ought to be re-examined every 6 months. Those in whom the spinal fluid still contained an excess of cells were given further courses until the number of lymphocytes fell to normal. Only two cases of blindness were encountered and both had previously, in 1928, been treated with atoxyl-emetic. The results are summarized as follows :—

Group I. Spinal fluid pathological before treatment = 166 cases.

A. Patients with normal fluid after treatment = 148 (89·15%) ; of these 76 were normal after a single course, and 72 after several courses.
B. Patients with condition of spinal fluid improved = 10 (6·02 per cent.), 9 after a single course and 1 after several courses.
C. Patients with spinal fluid unchanged = 8 (4·81 per cent.) ; 2 after 1 cure and 6 after several cures.

Group 2. Spinal fluid normal before treatment = 153 cases.

A. Patients with normal fluid after treatment = 150 (98·03 per cent.) ; 141 after a single cure and 9 after several cures.
B. Patients with abnormal spinal fluid = 3 (1·96 per cent.).

Group 3. Spinal fluid not examined before treatment = 141 cases.

A. Patients with normal spinal fluid after treatment = 116 (82·26 per cent.); 47 after a single cure and 69 after several cures.
B. Patients with abnormal spinal fluid after treatment = 25 (17·73 per cent.) ; 19 after a single cure and 6 after several cures.

From these figures it is concluded that in the great majority of cases tryparsamide treatment within a few months results in the production of a normal spinal fluid ; and in cases with normal spinal fluid it prevents the development of pathological changes. This result is often obtained from a single course of the drug.

In comment on this paper RODHAIN points out that the action of the drug at Lomami appears to be superior to its action in other parts of Africa. Possibly the strain of *T. gambiense* is peculiarly sensitive to arsenicals. The ultimate fate of the patient is a matter of great interest. *W. Y.*

BARLOVATZ (A.). Des réactions méningées consécutives au traitement, dans la maladie du sommeil. [**Meningeal Reactions in Sleeping Sickness following Treatment.**]—*Bruxelles-Méd.* 1933. Apr. 16. Vol. 13. No. 24. pp. 659–661.

The author draws attention to the meningeal reactions which are sometimes observed after the administration of various trypanocidal medicaments. He gives details of two cases in which both the number of cells and albumin content of the cerebrospinal fluid increased materially after a couple of subcutaneous injections of atoxyl.

He points out that these cases have not been selected. He believes that of 100 with normal cerebrospinal fluid treated in this way 70 are found to be cured after a year, and about 25 are sterilized, but show signs of evolution of nervous lesions ; in other words, the great majority of the non-cured show, after a lapse of time, altered cerebrospinal fluid, and this occurs more rapidly than in patients who remain untreated.

Details are next given of a case treated by tryparsamide and Bayer 205. Before treatment the cerebrospinal fluid showed 18 leucocytes per cmm. and a normal albumin content. On the 12th April, 1932, 2 gm. of tryponarsyl was given, and then, between 16th April and the 13th June, 10 gm. of tryponarsyl and 1·3 gm. of Bayer 205. Treatment was interrupted because the patient had become suddenly blind. On the 1st August the cerebrospinal fluid contained 600 leucocytes per cmm. and the albumin content had increased to 0·32. On the 8th

December lumbar puncture showed 19 leucocytes and a normal albumin content. She was then given 5 weekly injections of 0·7 gm. tryparsamide. On the 21st February, 1933, lumbar puncture showed 13 leucocytes and a normal albumin content; the blood and lymphatic glands were sterile.

The author remarks that reactions of this nature are exceptional after tryparsamide.

Similar meningeal reactions were seen with chloro-methylate of diamino-acridine [? trypaflavine]. *W. Y.*

VAN DEN BRANDEN (F.) & DUBOIS (A.). Influence d'une infection syphilitique antérieure sur les résultats du traitement de la maladie du sommeil. [**Influence of Old Syphilitic Infection on Treatment of S.S.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 557–567.

The authors discuss the influence of an old-standing syphilitic infection on the treatment of subsequently acquired trypanosomiasis.

Brief details, relating to the condition of the spinal fluid, and treatment with tryponarsyl, are given in respect of 26 patients, in all of whom the Wassermann reaction was strongly positive. The patients are divided into three groups: viz., those who were greatly benefited by treatment, those who were improved, and those who were not improved.

In commenting on these cases it is noted that a definite diagnosis of trypanosomiasis was made by the discovery of the trypanosomes, usually in the lymphatic glands. The patients were judged to be in the second stage of the disease, either because of the clinical condition or as the result of spinal puncture. The reasons for believing that they had all suffered from syphilis are discussed at length.

Among the 26 cases studied there were 14 successes (excluding the 5 cases who were improved). This figure, 50 per cent., agrees with that usually obtained in the treatment of second stage cases of sleeping sickness; and consequently, the authors conclude that the presence of syphilis does not appreciably aggravate the prognosis in trypanosomiasis, nor does it increase its resistance to therapy. *W. Y.*

DUBOIS. Sur la thérapeutique de l'infection à trypanosome " congolense " (Broden), par le Bayer 205 et l'émétique de potassium associés. [**Treatment of** *T. congolense* **Infection by Bayer 205 and Tartar Emetic in Association.**]—Reprinted from *Bull. Inst. Roy. Colonial Belge.* 1930. Vol. 1. No. 2. pp. 326–335.

The paper supports the view that Bayer 205 and tartar emetic together give better results in the treatment of *T. congolense* infections than does either drug given alone.

The strain of *T. congolense* used came from Leopoldville and had been kept for 3 years in guineapigs at Brussels. It now kills these animals in 9 to 11 days. The various experiments are summarized in a table from which it appears that a relapse always occurred after the administration of either drug given alone, but a number of cures followed the administration of the two drugs together.

The following are the conclusions:—

1. Our experiments confirm the real value of the combined Bayer 205-emetic treatment in guineapigs infected with *T. congolense.* Whether all strains of *T. congolense* and all animals are favourably influenced experience alone will show.

2. It is necessary to give high doses of tartar emetic.
3. The curative mechanism is obscure. It is not at present possible to consider as demonstrated the antimutative action described by Morgenroth.
4. Tryparosan *per os*, in doses of 700 mgm. per kilo. in two days, produced cure in two animals. *W. Y.*

DUBOIS (A.). Note préliminaire sur l'action thérapeutique d'un nouveau dérivé antimonial. [**Therapeutic Action of a New Antimonial Derivative.**]—9 pp. Congrès National des Sciences. [No place or date of publication.]

A preliminary report is given regarding the therapeutic activity of a new antimonial compound, Dn6, on guineapigs, rats and mice infected with either *T. congolense* or *T. pecaudi.*

The compound is stated to be antimonyl-bis-orthooxyquinoline-ana-sulphonate of diethylamine. It is less toxic than tartar emetic, the tolerated dose on subcutaneous injection being 150 mgm. per kilo. as compared with about 10 mgm. for emetic ; in intravenous injection the tolerated dose is less, probably about 60 mgm. The exact dosage of the medicament has not yet been determined precisely. It is too irritating to permit of its subcutaneous or intramuscular administration in man.

The drug had no action on *Spirochaeta hispanica* in guineapigs, but it was active against the pathogenic trypanosomes. Its action was superior to that of tartar emetic, and this fact, in the author's opinion, warrants its trial in trypanosomiasis of the domestic animals or even of man. *W. Y.*

LAUNOY (L.). Documents statistiques pour servir à l'étude du mécanisme des actions synergiques chimiques trypanocides, dans lesquelles intervient le 205 Bayer-309 Fourneau. [**Study of Mechanism of Synergic Action of Bayer 205-Fourneau 309.**]—*C. R. Soc. Biol.* 1933. Feb. 10. Vol. 112. No. 5. pp. 448–451. With 2 figs.

In analysing the mechanism of synergic actions it is necessary to know how the infected animals respond when subjected to each of the factors separately. With this object in view, the author has attempted to study the effect of a non-curative dose of " Bayer 205 " on mice infected with *T. congolense.*

In his experiments he used 93 mice : these were divided into two batches, the first of which consisting of 47 mice was inoculated with *T. congolense* and the infection allowed to run its normal course ; the second batch consisting of 46 mice was inoculated with *T. congolense,* and, when parasites had appeared in the blood, each animal was given a non-curative dose of 0·005 gm of Bayer 205 per 20 gm. of mouse.

The courses of the infection in the two batches of mice were then compared ; in the first batch the observation commenced at the time of the first appearance of trypanosomes in the blood, and in the second batch at the time of the appearance of the relapse parasites. Details are given regarding the incubation period, and time of death in the animals comprising each series and the results are shown in graphs. In the untreated batch the great majority of the animals had died within 10 days of the first appearance of trypanosomes in the blood ; in the treated batch the length of life counting from the time of the appearance of the relapse parasites in the blood is greatly prolonged in at least 60 per cent. of the mice. *W. Y.*

ABONDANO (Herrera Alberto). Contribution à l'étude de la chimiothérapie des trypanosomiases. Note préliminaire. [**Chemotherapy of Trypanosomiasis.**]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1932. Nov. Vol. 4. No. 11. pp. 413–414.

The author claims to have shown that a combined treatment consisting of picric acid and arsenobenzol gives better results in mice infected with *T. brucei* than does arsenobenzol alone.

The minimal lethal dose of picric acid for healthy mice is 20 cgm. per kilo., and for infected mice 10 cgm. per kilo. This drug given alone to infected mice had no action, nor had arsenobenzol (Pieroni) when given in doses of 5 cgm. or less per kilo. But when picric acid was given in association with the arsenobenzol a definite therapeutic effect was noticed. With another preparation (Néoiacol) still better results were obtained. It is further remarked that, as ZIRONI has already pointed out, the very stable arsenobenzol "bicopulé" (Pieroni) is much less active than is the less stable arsenobenzol "monocopulé."[*] *W. Y.*

DORTMANN (Heinrich). Studien ueber das Zustandekommen des trypanoziden Effektes bei verschiedenen Stoffen. [**Studies on the Trypanocidal Effects of Different Substances.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1932. Vol. 77. No. 5/6. pp. 403–420. [61 refs.]

The following summary is given :—

1. The autolysate of certain bacteria is able to kill *T. equiperdum in vitro.* The autolysate of the hay bacillus has a particularly powerful trypanocidal action, whilst that of the Wurzel bacillus A is less active. The degree of the trypanocidal action of these substances is dependent on the duration of the autolysis; the longer it is, the greater the trypanocidal action. The autolysates of the other bacteria examined exhibited no trypanocidal action.

The filtrates of broth cultures of various bacteria may possess trypanocidal properties. The filtrate of the *Bacillus subtilis* is but slightly active, whereas that of *Bacillus pyocyaneus* is very potent.

In animal experiments the bacterial products exhibit no trypanocidal action. Apparently the action of the bacteria within the animal body is nullified by certain protective functions of the animal organism. Previous treatment of mice with the autolysate of *Bacillus subtilis* sufficed to enhance slightly the resistance of the animals to subsequent infection with *T. equiperdum,* as also did vaccination with *Bacillus coli* or *Bacillus typhosus.*

2. The combination of normal human serum with dyes (argoflavin and trypanblue) results in a definite increase of the trypanocidal action of the single components. The combination of human serum and trypanblue is especially active and can produce definite cures. This powerful effect suggests the possibility of some direct action beyond the indirect effect of the single components.

The combination of normal human serum with antimosan gives on the contrary no better results than the single components.

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[*] In an article published in 1924 ZIRONI[†] calls attention to the work of CONTARDI and CAZZANI who divide arsenobenzol derivatives of 606 into three groups, A, B and C. In the first are two series of products: one with a single amino group joined to the acid residue, the other with both amino-groups so united. It would appear from the above that the product with the single group (monocopulé) parts with it more readily than does the other, with two groups (bicopulé), in the presence of picric acid.

[†] ZIRONI (Amilcare). Contributo allo studio del potere terapeutico e della tossicità degli arsenobenzoli. Parte Prima. Gli arsenobenzoli nella terapia di infezioni tripanosomiasiche.—*Boll. Istituto Sieroterap. Milanese.* 1924. Aug. Vol. 3. No. 5. pp.

3. The preparations "Euthagen" [a silver compound] and hexylresorcin exert *in vitro* a definite trypanocidal action, but this is not manifest in animal experiments. *W. Y.*

i. YORKE (Warrington), MURGATROYD (Frederick) & HAWKING (F.). **Studies in Chemotherapy. VIII. Comparison of Strains of *T. rhodesiense* made Resistant to Various Arsenicals and Antimonials, to Bayer 205, and to Acriflavine, respectively.**—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 577–586.

ii. ——, —— & ——. **Studies in Chemotherapy. IX. Sodium Thiosulphate and Arsenic-Resistance.**—*Ibid.* pp. 587–596.

i. The last paper of this series was noticed above, page 111. The series deals with drug resistance.

The authors have already shown that a strain of *T. rhodesiense* made resistant to atoxyl is indistinguishable from a strain of the same parasite made resistant to acriflavine. The two strains exhibited marked resistance to all the aromatic compounds of arsenic and antimony and to acriflavine, but were as sensitive to sodium arsenite, tartar emetic, and Bayer 205 as the normal strain. The authors now inquire whether it is also possible by treatment of infected animals with subcurative doses of the other commonly employed aromatic arsenical and antimonial compounds, of tartar emetic, and of Bayer 205 to produce resistant strains and whether the resulting strains are similar to the atoxyl-fast and acriflavine-fast strains. Their conclusions are adequately stated in their summary :—

" 1. The object of the work described in this paper was, firstly, the preparation of a number of strains resistant to various drugs, and secondly, the comparison of the resulting resistant strains to see how far they differed from one another and from the normal parent strain.

" The normal strain used was an old laboratory strain of *T. rhodesiense*, and the technique employed in the endeavour to produce the resistant strains was the customary one of treating mice infected with the normal strain with subcurative doses of the drugs, and gradually increasing the doses as relapses occurred in the original mice and in those of later passage. The compounds to which it was attempted to produce resistant strains were :—

"A. *Aromatic compounds of arsenic.*—Atoxyl, arsacetin, tryparsamide, reduced tryparsamide thioglycollate, halarsol, novarsenobillon and arsenophenylglycine.

" B. *Aromatic compound of antimony.*—Stibenyl.

" C. *Non-aromatic compound of antimony.*—Tartar emetic.

" D. *Acriflavine.*

" E. *Bayer* 205.

" 2. By this procedure it was found possible to produce resistant strains with every drug, except tartar emetic.

" 3. The speed with which resistant strains were produced varied considerably. With atoxyl, arsacetin, tryparsamide, reduced tryparsamide thioglycollate, stibenyl and acriflavine, highly resistant strains were produced within 4 to 8 weeks. The production of halarsol- and novarsenobillon-fast strains required a period of about 3 months ; the arsenophenylglycine-fast strain developed still more slowly ; and the Bayer 205-fast strain did not attain to its maximum degree of resistance until after more than 12 months. For reasons stated, however, it is possible that to some extent these differences may be more apparent than real.

" 4. Comparison of the resulting strains showed that they could be arranged into the following 4 groups :—

" (*a*) Strongly resistant to the aromatic compounds of arsenic (except arsenophenylglycine) and of antimony ; slightly resistant to arsenophenylglycine ; sensitive to tartar emetic and to Bayer 205, viz., *atoxyl-fast*, *arsacetin-fast, tryparsamide-fast, reduced tryparsamide-fast, halarsol-fast, novarsenobillon-fast,* and *acriflavine-fast* strains.

" (*b*) Resistant to arsenophenylglycine; moderately resistant to the other aromatic arsenicals and antimonials; sensitive to tartar emetic and to Bayer 205, viz., *arsenophenylglycine-fast* strain.

" (*c*) Similar to Group A, but resistant to tartar emetic, viz., *stibenyl-fast* strain.

" (*d*) Strongly resistant to Bayer 205; sensitive to all the other drugs, viz., *Bayer 205-fast* strain.

" 5. These facts appear to admit of the following generalizations:—

" (*a*) Resistance to Bayer 205 does not involve resistance to arsenical or antimonial compounds, and conversely resistance to the latter does not mean resistance to the former.

" (*b*) Resistance to an aromatic arsenical or antimonial compound implies resistance to other aromatic arsenicals and antimonials; but this does not necessarily mean that a strain made resistant to one aromatic arsenical is identical with that made resistant to another, *vide* the differences in degrees of resistance exhibited by a tryparsamide-fast strain and a strain made resistant to arsenophenylglycine.

" (*c*) A strain made resistant to an aromatic arsenical is sensitive to tartar emetic, whereas a strain made resistant to an aromatic antimonial is resistant to tartar emetic. This fact calls for special comment. Although it is extremely difficult, or even impossible, to produce a tartar emetic-resistant strain by the ordinary direct method of administering subcurative doses of the drug to mice infected with the normal strain, it is exceedingly easy to produce a resistant strain by the indirect method of first producing an atoxyl-resistant strain and then acting upon it with tartar emetic. There is evidence to believe that stibenyl, like the other aromatic antimonial compounds, readily undergoes a certain amount of decomposition when introduced into the animal body; and we believe that the mechanism, whereby a stibenyl-fast strain becomes emetic-fast, is similar to that whereby an atoxyl-fast strain can subsequently be made emetic-fast."

The authors draw attention to the ease with which a strain resistant to atoxyl may be made resistant to tartar emetic: two or three doses sufficed for mice. They think it may have an important bearing on atoxyl plus tartar emetic treatment in man.

ii. CITRON claims to have destroyed the resistance of a salvarsan-fast strain of trypanosomes by prolonged treatment of a series of infected mice with sodium thiosulphate [see this *Bulletin*, Vol. 28, p. 912]. The authors repeated this work and give details of their experiments which those interested will consult. Their attempts to influence the resistance of atoxyl-fast and novarsenobillon-fast strains of *T. rhodesiense* (*a*) by repeated administration of sodium thiosulphate to series of infected mice, and (*b*) by repeated exposure of these strains to concentrated solution of sodium thiosulphate *in vitro* were fruitless. Hence they were unable to confirm CITRON. *A. G. B.*

YORKE (Warrington), MURGATROYD (Frederick) & HAWKING (Frank). **Effect of Passage through Glossina on the Resistance of a Tryparsamide-fast Trypanosome.**—*Brit. Med. Jl.* 1933. Feb. 4. pp. 176–179.

——, —— & ——. **Studies in Chemotherapy. X. Further Observations on the Transmissibility of Tryparsamide-Resistance by Glossina.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 157–178.

In these papers it is shown that a strain of trypanosomes (*T. brucei*) possessing a high degree of resistance to the aromatic arsenicals, when transmitted by Glossina maintained its resistance unimpaired even after two successive passages through the fly.

The importance of drug-resistance is stressed, and especially the question whether a drug-resistant strain is still drug-resistant after cyclical development in its insect host. The problem has been studied by WERBITZKI and GONDER (1911), by REICHENOW and REGENDANZ (1927) and by DUKE (1927) [see this *Bulletin*, Vol. 24, p. 947 and Vol. 25, p. 349] ; the experiments failed to solve it satisfactorily because there is reason to believe that their so-called resistant strains were little, if any, more resistant than the parent strains.

The authors at Liverpool obtained pupae by air-mail of *G. morsitans* from Tanganyika and of *G. palpalis* from Uganda. The trypanosome was a strain of *T. brucei* obtained from a dog in Ankole, Uganda, in April, 1931, and since maintained in guineapigs. It is a polymorphic trypanosome with numerous posterior nuclear forms. The response of this strain in mice and guineapigs to various arsenicals was ascertained ; *e.g.*, it was found that the minimum effective dose of tryparsamide for guineapigs was 0·05 gm. per kilo. Details of these experiments are tabulated. An infected guineapig was treated from September to November with repeated small, but gradually increasing, doses of tryparsamide and finally 0·5 gm. failed to clear the blood of parasites. The strain was then submitted to arsenicals in subinoculated guineapigs and mice and was found to resist the maximum doses tolerated by these animals.

Transmission experiments.—Three experiments were made, each with *G. palpalis* and *G. morsitans* fed on infected guineapigs and afterwards on a series of healthy guineapigs. In No. 1 the normal parent strain was successfully transmitted ; in No. 2 the branch of the strain made resistant to tryparsamide, and in No. 3 the same strain after passing through Glossina in No. 2. A table gives the details. In each experiment at least one fly was found to have gut and salivary glands infected. In the three experiments of 205 *palpalis*, alive at the first feed on the clean animal, 9 (4·5 per cent.) showed infection of gut only, and 3 (1·5 per cent.) infection of gut and salivary glands ; and of 87 *morsitans* 9 (10·4 per cent.) showed infection of gut and 4 (4·6 per cent.) infection of gut and salivary glands.

The response of the transmitted strains to arsenicals was then tested. The table shows the minimum effective dose of various drugs for mice infected with the normal and tryparsamide-resistant strains before and after transmission by Glossina.

Drug.	Normal Strain.		Tryparsamide-resistant strain.		
	Parent.	After passage through Glossina.	Parent.	After one passage through Glossina.	After two passages through Glossina.
Tryparsamide ...	8	6–10	45+	45+	45+
Reduced Tryparsamide	0·06–0·1	0·08	2+	2+	2+
Arsacetin	3	4	30+	30+	30+
Halarsol	0·03	0·03	0·6+	0·6+	0·6+

N.B.—The figures represent milligrams of drug per 20 gm. of mouse.

The author's conclusions follow :—

" 1. In this paper a detailed account is given of experiments devised with the object of ascertaining whether a tryparsamide-fast strain of trypanosomes is transmissible by Glossina, and if so whether its resistant character persists after passage through the fly.

" 2. The trypanosome used was a strain of *T. brucei*, isolated from wild *G. morsitans* in Uganda in 1931, and subsequently maintained in the laboratory by passage through guinea-pigs for a period of 18 months. Careful examination of the strain showed that in so far as its morphology and pathogenicity were concerned it was indistinguishable from other strains of *T. brucei* recently isolated from Glossina : this implies that the strain had undergone no discoverable change during its 18 months' sojourn in guinea-pigs. The response of the strain to arsenicals was then carefully determined : in guinea-pigs the M.E.D. of tryparsamide was about 0·05 gm. per kilo ; and in mice the M.E.D. of tryparsamide was 8 mgm., of reduced tryparsamide 0·06 to 0·1 mgm., of arsacetin 3 mgm., and of halarsol 0·03 mgm. per 20 gm.

" 3. The tryparsamide-resistant variety was made by repeated administration of gradually increasing doses of the drug to an infected guinea-pig ; eventually the resistance of the strain was increased to a point when it withstood the maximum dose well-tolerated by a guinea-pig, *i.e.*, about 10 times the M.E.D. for the normal strain. It is of importance to note that this change in drug-resistance was not accompanied by any change in morphology or pathogenicity. Experiments showed that in guinea-pigs this resistant strain withstood 0·5 gm. of tryparsamide per kilo ; and in mice 45 mgm. of tryparsamide, 2 mgm. of reduced tryparsamide, 30 mgm. of arsacetin and 0·6 mgm. of halarsol per 20 gm. From this it follows that the strain resisted the maximum doses of the various drugs tolerated by the vertebrate hosts.

" 4. In the transmission experiments both *Glossina palpalis* and *Glossina morsitans* were used. The insects were sent to this country in the pupal state by air mail. An account is given of the methods employed for the maintenance of the flies in the laboratory, and of the technique adopted for the transmission experiments.

" 5. Transmission experiments were successful with :—

" (i) The normal parent strain.

" (ii) The Tryparsamide-resistant branch of the parent strain. (1st fly-passage).

" (iii) The Tryparsamide-resistant branch which had already been once transmitted by Glossina (2nd fly-passage).

" Some evidence was obtained which suggests that the strain of *T. brucei* used was more easily transmissible by *G. morsitans* than by *G. palpalis*.

" 6. The transmitted strains were carefully examined as regards their morphology, pathogenicity and response to arsenicals. It was found that in none of these respects had the two strains been modified as the result of their passage through Glossina.

" The normal strain after passage through Glossina was just as sensitive to arsenicals as it had been previously, and similarly two successive passages of the resistant-strain through Glossina had in no degree lessened its resistant characters.

" 7. These experiments afford, in our opinion, conclusive proof that :—

" (i) Strains of trypanosomes possessing a high degree of resistance to the aromatic arsenicals are transmissible by Glossina.

" (ii) The acquired character of drug-resistance is unimpaired after two successive passages through Glossina." *A. G. B.*

LESTER (H. M. O.). **The Influence of Cyclical Transmission by** *Glossina tachinoides* **on a Strain of** *Trypanosoma brucei*, **made Resistant to Human Serum.**—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 525–537. With 1 diagram. [15 refs.]

In this paper the author gives an account of experiments devised with the object of ascertaining whether the acquired character of serum resistance in a strain of *T. brucei* was preserved after passage through *G. tachinoides.*

The strain of *brucei* used was isolated from *G. morsitans* in May, 1930. When the experiments were commenced it was five months old and had been maintained by direct transmission through a series of 3 dogs and 3 rhesus monkeys When freshly isolated the strain was somewhat avirulent, but the direct transmissions had exalted its virulence to such an extent that it killed small laboratory animals—guineapigs, rats and mice—in a few days. The parasite was made resistant to human serum by treating infected mice with repeated doses of serum. The strain was then returned to a guineapig, which was subsequently given an intraperitoneal injection of 6 cc. of serum. This dose cleared the peripheral blood of the guineapig in a few hours, and on subsequent passage into a mouse the strain was found to have lost a considerable portion of its serum resistance. Consequently, further treatment was necessary before the strain became sufficiently serum fast for the fly transmission to be attempted. A stage was eventually reached at which the trypanosomes in the mouse were fast to 1 cc. of human serum even after intermediate passage through the guineapig.

Details of the transmission experiments are given in a diagram, and a table shows that the trypanosome was resistant to human serum after cyclical passage through the tsetse.

The following summary is given :—

" 1. As a result of their discovery of the trypanocidal action, *in vitro*, of normal human serum, Yorke, Adams & Murgatroyd elaborated a hypothesis regarding the epidemiology of rhodesiense and gambiense sleeping sickness. They postulate that, although *T. rhodesiense* is identical with *T. brucei*, normal human beings cannot be infected with the game trypanosomes because of the trypanocidal power of their serum. In certain pathogenical conditions the blood of man loses its trypanocidal power, allowing the game trypanosomes to become established.

" 2. If this hypothesis is correct, the serum-fast character, once it has been acquired by the game trypanosomes, must be preserved during cyclical transmission by tsetse. In order to throw some light on this point, a strain of *T. brucei*, originally quite serum-sensitive, was kept in mice which were treated with repeated doses of normal human serum. When once the strain became serum-fast it was passed by cyclical transmission through *G. tachinoides*. On testing again the reaction of the strain to human serum, it was found that the acquired serum-resistance had been preserved through the fly.

" 3. After cyclical transmission the virulence of the strain to small laboratory animals had diminished very greatly. This was particularly well shown in mice. Before cyclical transmission, the behaviour of the strain was in accordance with the classical description. Trypanosomes appeared in the blood after a short incubation period, and increased in number steadily until the death of the mouse. After passing through tsetse there was a long incubation period, trypanosomes were never at all numerous in the blood, and there were numerous relapses. Several mice lived more than six months, showing only an occasional scanty infection in the blood. In view of these observations it is difficult to believe that the mouse can have no defensive mechanism against the pathogenic trypanosomes.

" 4. The doubt arises as to whether much of the work done with old laboratory strains, the characteristics of which have been changed by constant syringe passage, can give a true picture of what occurs in nature."

W. Y.

TRENSZ (F.) & JARDON (M.). Les protides du sérum et la réaction de Henry dans la trypanosomiase expérimentale. (Note préliminaire.) [**Serum Proteids and Henry's Reaction in Experimental Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 442–444.

The researches show that in so far as the serum proteins are concerned there is a similarity between experimental trypanosomiasis, malaria, and kala azar.

The authors have estimated the amount of euglobulin in the serum of guineapigs and rabbits infected with *T. berberum* and have compared the results with those obtained in normal animals. In 19 normal guineapigs the average amount of euglobulin in the serum was 0·44 gm. per litre. In 41 infected guineapigs there was a slight increase in the euglobulin within 8 to 10 days after inoculation ; at this time Henry's reaction was doubtful. As the disease progressed the titre of euglobulin steadily increased, Henry's reaction became quite definite, and the serum acquired the property of flocculating in distilled water. It is noted that the 13 doubtful Henry reactions corresponded to an average euglobulin titre of 0·83 gm. per litre ; in the 20 positive Henry reactions the amount of serum euglobulin was 2·15 gm. per litre ; in the 4 cases with strongly positive Henry reactions the euglobulin was 3·71 gm. per litre ; and in 4 with massive Henry reactions the euglobulin was 8·1 gm. per litre. The sera giving the strongest Henry reactions flocculated in distilled water.

It appears therefore that Henry's reaction is always associated with a hypereuglobulinaemia, but the reverse is not always true.

W. Y.

NATTAN-LARRIER (L.) & NOYER (B.). Vitalité et résistance des trypanosomes métacycliques. [**Vitality and Resistance of Metacyclic Trypanosomes.**]—*C. R. Soc. Biol.* 1933. Apr. 10. Vol. 112. No. 13. pp. 1276–1279.

The author describes the resistance of the leptomonas forms and the metacyclic forms of *Trypanosoma rabinowitchi*. Cultures were made on blood agar, and after incubation at 38°C. for 48 hours a rich growth containing both forms was obtained. With this material it was easy to compare the vitality of the two forms under various physical and chemical conditions. The work shows that the metacyclic forms are definitely more resistant than are the leptomonas forms. *W. Y.*

DUKE (H. Lyndhurst). **The Polymorphic Trypanosomes of Damba Island, Victoria Nyanza. II.—Their Transmissibility by** *G. palpalis*.—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 597–601.

This paper is concerned with the transmissibility by *G. palpalis* of three strains of trypanosomes obtained from wild *G. palpalis* on Damba Island in 1932. Details of the experimental work are given in tables.

The following is the summary.

"1. One of the three 1932 strains of the Damba trypanosome, No. 912, was on its first isolation considerably more transmissible by *G. palpalis* than the other two strains.

"2. The transmissibility of this strain is higher than the majority of *T. gambiense* strains examined, and approaches the standard commonly reached by *T. rhodesiense* strains in the experiments carried out at Entebbe over a number of years.

"3. Strain 912 is more readily transmissible by *G. palpalis* than any other strain previously isolated from *Tragelaphus spekei* on Damba Island."

W. Y.

DUKE (H. Lyndhurst). **Infection Rate of *Glossina* and Temperature.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Mar. 23. Vol. 26. No. 5. p. 481.

In this letter Duke states that he wishes to remove the misunderstanding which might arise as a result of TAYLOR's quotation of his (Duke's) reference to LLOYD's use of incubator temperatures as "artificial and enervating." Duke writes as follows :—

> "My attitude, revealed by the use of the words 'enervating and artificial,' was simply that the conditions of experiment in LLOYD's laboratory were not representative of the normal fluctuations of laboratory conditions in the locality, nor were they similar to or even comparable with those obtaining at Entebbe. It seemed to me unreasonable to base the far-reaching conclusions reached in LLOYD's summary on evidence of this nature, especially as the conclusions reached in Uganda rested entirely on work done at the ordinary temperatures in a laboratory situated about a quarter of a mile from the lake edge, where the local fly live.
>
> "Dr. TAYLOR's experiments are obviously of quite a different nature, and having during the last year utilised the incubator myself I wish to repudiate his imputation that I have ever regarded this method of experiment as of no significance."

W. Y.

BROWN (A. Forbes). **The Red Cell Adhesion Test in a Case of Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Mar. 23. Vol. 26. No. 5. pp. 471–472.

Details are given of a case which was considered on clinical grounds to be one of trypanosomiasis, although daily blood examinations over a period of three weeks were negative. The cerebrospinal fluid contained 240 cells per cmm.; gland puncture was negative.

A small provocative dose of tryparsamide was given intravenously and the serum sent to Entebbe for the adhesion test, with the following results :—*Trypanosoma gambiense*, strain Brander was 75 per cent. positive; strain McAlley was 94 per cent. positive; strain Hamburg was 96 per cent. positive. The patient was then sent to Entebbe and the blood inoculated into a monkey which, in due course, showed *T. gambiense* in its blood. The author concludes as follows :—

> "One cannot perhaps insist very strongly on the lessons afforded by a single case. In spite of the failure to demonstrate trypanosomes in the patient's blood by what must be regarded as a very exhaustive examination, the clinical symptoms pointed inexorably to the diagnosis of trypanosomiasis. The red-cell adhesion test supplied invaluable

confirmation of recent infection and led to the appeal to animal inoculation. It would be interesting to learn if other clinicians with more opportunities than the writer have found the test equally useful."

W. Y.

WORMALL (A.). **Some Observations on the Value and the Mechanism of the Red-Cell Adhesion Test for Trypanosomiasis of Man and Other Animals.**—*Parasitology*. 1933. Feb. Vol. 25. No. 1. pp. 64–76. [12 refs.]

The work described in this paper was concerned mainly with attempts (*a*) to reduce and possibly abolish "non-specific" adhesion, (*b*) to increase the percentage of positive results with established cases of trypanosomiasis, and (*c*) to determine whether it would be possible to introduce such modifications as would allow tests to be made with sera which had been collected several days previously.

The following is the summary :—

"1. The results of further tests with the red-cell adhesion phenomenon in trypanosomiasis of man and other animals, described first by Duke & Wallace (1930) and later by Wallace & Wormall (1931), are discussed.

"2. The conclusion is reached that the tests should always be made with several different strains of trypanosomes ; in this way the number of negative results with undoubted cases of trypanosomiasis is decreased considerably. It is also advisable to have available stock adhesin sera (human or monkey) so that preliminary tests can be made to determine whether the trypanosomes in any animal are capable of giving adhesion. In doubtful cases of trypanosomiasis, treatment with trypanocidal drugs should be started. This treatment usually results in a marked improvement in the power of the serum or plasma of men and monkeys infected with trypanosomes to give red-cell adhesion.

"3. If a suitable small amount of phenol is added to the serum of a trypanosomiasis patient, this serum can be kept at the ordinary temperatures for 3 weeks or more without appreciable loss of its power to give red-cell adhesion. In this way it is possible to carry out tests at a central laboratory on sera which have been collected at outlying stations.

"4. Experiments have been carried out to determine the amounts of adhesin and complement (or 'X factor') required for red-cell adhesion.

"5. The adhesin is non-dialysable, and in this, and many other respects, it behaves like a true immune body." *W. Y.*

DUKE (H. Lyndhurst). **The Domestic Fowl of Uganda as a Host for Trypanosomes of the *Brucei* Group.**—*Parasitology*. 1933. Apr. Vol. 25. No. 2. pp. 171–191. [22 refs.]

These experiments show that the domestic fowl can act as host for trypanosomes of the *brucei* group but not very readily and that in the blood of such birds as become infected trypanosomes are rare. The fowl is unlikely to be a factor in the spread of human trypanosomiasis in nature.

The following summary is given :—

"1. The domestic fowl of Uganda is susceptible to infection with *Trypanosoma rhodesiense* and with *T. brucei* by the bite of *Glossina palpalis* or *G. morsitans*.

"2. A fowl so infected with *T. rhodesiense* can infect clean *G. palpalis* fed upon it, but apparently only with very great difficulty. In theory, therefore, the fowl may play a part in the spread of *Trypanosomiasis rhodesiensis* in nature.

"3. Of 17 fowls bitten by flies carrying heavy gland infections of *T. rhodesiense* only four gave any evidence of infection. In the case of *T. brucei,* 12 fowls were exposed and only one became infected. Two fowls exposed to the Damba trypanosome failed to become infected.

"4. There is some evidence to show that the fowl is only infective to fly in the early stages of its infection, and even then only very slightly. The occurrence of three very slight infections in flies dissected 8 and 10 days after feeding on the infected bird suggests that in the fowl the trypanosome is usually not in a state favourable to development in the tsetse, although it may so develop in an apparently normal manner.

"5. A strain of *T. rhodesiense,* recovered by inoculation into a clean monkey of blood from a fowl experimentally infected by fly-bite, proved in the monkey to be transmissible by tsetse in a perfectly normal manner. Any inhibition of transmissibility exerted by the fowl is therefore temporary and attributable to the influence of the tissues of the bird on the trypanosome.

"6. Of the infected fowls observed in the course of the above experiments only one appeared to be ill. This bird showed unilateral conjunctivitis and general malaise. It was killed some 25 days after its infection, and the inoculation of 10 cc. of its blood infected a clean monkey with *T. rhodesiense* after an incubation period of 6 days. This bird was responsible for one of the two heavy infections found in the 4,339 *G. palpalis* dissected in the course of the above experiments.

"7. That trypanosomes are very rare in the blood of infected fowls is suggested by the failure to infect a clean monkey by the inoculation of 10 cc. of the blood of Fowl 39 a day or two after this bird had caused abortive infections in two clean tsetse. For this reason it is difficult to estimate the susceptibility of the fowl to trypanosomes, as blood inoculation is apparently not an infallible method of demonstrating infection.

"8. From the experiments described in this paper it appears very unlikely that the fowl need be regarded as a factor in the spread of human trypanosomiasis in nature, at all events in *G. palpalis* regions.

"9. There is evidence that the fowl may be more susceptible to infection with *T. rhodesiense* than with *T. brucei,* but only one strain of *T. brucei* was tested. *W. Y.*

HU (C. H.) & CH'IN (K. Y.). **Development of Lymphocytes and Plasma Cells in Rats Experimentally Infected with Trypanosomiasis.**—*Proc. Soc. Experim. Biol. & Med.* 1933. Jan. Vol. 30. No. 4. pp. 435–436.

In a previous study the authors had found that there was a marked increase of large and medium sized cells with big irregular chromatin masses and abundant basophilic cytoplasm in the spleen and mesenteric and mediastinal lymph nodes of white rats infected with *T. brucei.* These cells, owing to the large numbers of mitotic figures they contained, were considered to be lymphoblasts.

The observations recorded in the present paper were undertaken in order to ascertain why only a certain number of the small lymphoid cells in the lymphoid organs can form large lymphoblasts by hypertrophy, while others remain unchanged. For this purpose, supravital studies were made on the lymphoid organs and blood of a large number of normal and infected animals.

The authors state that "the results indicate: (1) that the small lymphoid cells which can hypertrophy are really the small lymphoblasts, and those which cannot hypertrophy are the intermediate forms and the small lymphocytes; (2) that in the lymphoid organs of the infected animals there is an increase of lymphoblasts having the supravital staining characteristics mentioned in the previous communication; (3) that mitotic figures are present only in the large and medium-sized cells having the characteristics of lymphoblasts; (4) that plasma cells which are greatly increased in the latter part of infection are derived from lymphoblasts; and (5) that in the blood of the animals at certain stages of infection there was also an increase of the lymphoblasts and occasional presence of plasma cells." *W. Y.*

ZSCHUCKE (Johannes). Erwiderung auf die Arbeit von P. Regendanz: Die experimentelle Erzeugung von Schlafkrankheit beim natürlich immunen Pavian durch Infektion des Liquor cerebrospinalis Archiv für Schiffs- und Tropen-Hygiene, Heft 8, 1932. [**Observations on Regendanz's Experimental Infection of Naturally Immune Baboons by Intrathecal Injection.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Apr. Vol. 37. No. 4. pp. 194-196.

REGENDANZ (P.). Antwort auf vorstehende Erwiderung von Dr. Johannes Zschucke auf meine Arbeit: Die experimentelle Erzeugung von Schlafkrankheit beim natürlich immunen Pavian durch Infektion des Liquor cerebrospinalis. [**Rejoinder to Zschucke's Criticism.**]—*Ibid.* pp. 196–198.

Zschucke comments on certain points raised by Regendanz in his recent work on the experimental infection of baboons with sleeping sickness by intrathecal injection (*ante*, p. 117).

He criticizes strongly Regendanz's statement that lumbar puncture should not be made in early cases of sleeping sickness, because of the danger of infecting the cerebrospinal fluid. Zschucke's opinion is that there is very little danger of this, and in any case it is probable that in many patients the central nervous system is infected from the blood at a very early stage of the disease. To exclude lumbar puncture is to exclude one of the most important means of diagnosis.

In the second place Zschucke disputes Regendanz' statement that the nervous symptoms and histological changes in the brain are due to toxins produced by trypanosomes in the cerebrospinal fluid which penetrate the sheaths of the cerebral vessels. Zschucke complains that this appears to be a complicated explanation and that he himself was quite unable to discover any evidence of toxins in the cerebrospinal fluid. He comments on the rarity of trypanosomes in the spinal fluid.

In the third place, Zschucke criticizes Regendanz's statement that human trypanosomiasis would be a harmless disease if the trypanosomes were merely blood parasites.

ii. Regendanz replies at some length to these criticisms. He considers that there is no evidence to support Zschucke's contention that the histological changes in the brain in sleeping sickness patients are regularly the result of blood infection. In his opinion the nervous changes are due to trypanosomes which have penetrated into the cerebrospinal fluid: he draws attention to the fact that in his experiments trypanosomes were never found in the blood of the baboons, and consequently it is unlikely that they reached the circulation from the cerebrospinal fluid.

In reply to Zschucke's second point Regendanz rejoins that toxins have never been demonstrated in the blood, and yet it is commonly held that they are present. He considers his theory is more natural and simpler than one which assumes that the nervous changes are due directly to blood infection. He is not opposed to lumbar puncture on principle, but only against lumbar puncture in the early stage of the disease without specific indications. *W. Y.*

KOFOID (Charles A.) & DONAT (Fae). **Experimental Infection with** *Trypanosoma cruzi* **from Intestine of Cone-Nose Bug,** *Triatoma protracta.*—*Proc. Soc. Experim. Biol. & Med.* 1933. Jan. Vol. 30. No. 4. pp. 489–491.

—— & ——. **The Experimental Transfer of** *Trypanosoma cruzi* **from Naturally Infected** *Triatoma protracta* **to Mammals in California.**—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No 2. pp. 257–259.

In 1916, Kofoid and MCCULLOCH described a trypanosome from the digestive tract of the cone-nose bug, *Triatoma protracta,* in California. Although its morphological characters and developmental stages in the bug were indistinguishable from those of *T. cruzi,* the fact that the authors were unable to infect white rats made it impossible to classify the organism definitely as *T cruzi,* and it was therefore tentatively named *T. triatomae.*

The present papers describe the successful infection of white rats, the Virginia opossum (*Didelphis virginiana*) and the wood rat (*Neotoma fuscipes*) As a result of these observations, it is concluded that *T. triatomae* is identical with *T cruzi* No human cases of Chagas' disease have so far been recorded in California, but brief illness, and occasionally prolonged illness, has been reported following the bite of the cone-nose bug. *W. Y.*

WHITNALL (A B. M) **The Trypanosome Infections of** *Glossina pallidipes* **in the Umfolosi Game Reserve, Zululand. (Preliminary Report.)**—*Union of South Africa. 18th Report, Director Vet. Services & Animal Industry, Onderstepoort, Pretoria 1932. Aug.* Pt. I pp. 21–30 With 1 map & 7 figs.

The following summary is given:—

"The paper gives an account of the trypanosome infections of *G pallidipes* in Zululand Attempts have been made to correlate this with game and the nature of the vegetation Thus it appears that where most game is, the trypanosome infection of tsetse is highest Where there is water and dense floral growth the percentage of infected flies is higher than where the vegetation is of a more open nature

"*T vivax* is the most common trypanosome in the fly, followed by *T congolense* and then *T brucei* It is possible for trypanosomes of the proboscis, gut and salivary gland group to occur in areas where nagana is prevalent, but sleeping sickness does not occur

"There is a predominance of females caught in the traps at all localities within the Reserve 30 per cent to 40 per cent of the females are in various stages of pregnancy, while 90 per cent of the males are regarded as 'thin' Young flies are scarce" *W. Y.*

FINE (J) **Is Trypanosomiasis in the Lactating Rat Transmitted to the Sucking Young?** [Miscellanea]—*Ann Trop Med & Parasit* 1933 Apr 10 Vol 27 No 1 pp 180–181

Details are given of a series of experiments indicating that trypanosomiasis in the female rat is not conveyed to the young in the process of lactation *W. Y.*

MALARIA.

STRICKLAND (C.), ROY (D. N.) & CHAUDHURI (H. P.). **A Year's Observations in Calcutta on the Invasion of the Salivary Glands of** *Anopheles stephensi* **by Malarial Sporozoites, and the Influence of Some Climatic Conditions.**—*Indian Jl. Med. Res.* 1933. Jan. Vol. 20. No. 3. pp. 819–840. With 3 charts.

The authors found it very easy to infect *A. stephensi* during the cold weather, but almost impossible in the hot weather. This is opposed to BENTLEY's observations in Bombay, where he found naturally infected mosquitoes most numerous in the hot weather. Sporozoites were found in 9 out of 24 mosquitoes fed on patients with *P. malariae* infections.

The authors used laboratory-bred mosquitoes which were kept in cages in the laboratory Sixty-two batches were fed during the period January 1931 to February 1932. The shortest interval between feeding and the finding of sporozoites in the glands was 8 days; the longest was 41 days. The rate of gland infection during the period March to July was only 0·74 per cent., but, during the cold weather months, it was 75 per cent. There seems to be a definite check to the invasion of the glands in the hot weather and in the rains. Gland infection was found in 9 of 24 mosquitoes fed on patients with quartan malaria, and the authors consider that if *A. stephensi* is fed on patients with more than 120 gametocytes of any of the three species, during the period of maximal infection, November to January, a 100 per cent. of infections is obtainable. The most favourable temperature for infection lay between 62° and 87°F., or between the means of 71° and 76·5°F. The most favourable relative humidity (mean) was 66 to 70 per cent. The coefficients of correlation between the infection-rates and the physical conditions were worked out by Dr. Chaudhuri; he concludes that *A. stephensi* in Calcutta should not become infected when the relative humidity is above 85 per cent. or below 45 per cent.; or when the temperature is above 95° or below 62°F. *W. Fletcher.*

IYENGAR (M. O. T.). **Experimental Infection of Anopheline Mosquitoes.** —*Indian Jl. Med. Res.* 1933. Jan. Vol. 20. No. 3. pp. 841–861.

The author fed batches of mixed species of anopheles on malaria patients. He gives lists of the species which he successfully infected with subtertian, benign tertian, and quartan respectively.

The following species were found susceptible to experimental infection with *P. falciparum*:—*A. aconitus*, *A. jamesii*, *A. ludlowii*, var. *sundaica*, *A. minimus*, *A. stephensi*, *A. varuna* and, slightly, *A. fuliginosus*. Six species were susceptible to *P. vivax*, namely:—*A. aconitus*, *A. minimus*, *A. stephensi*, *A. varuna*, *A. fuliginosus*, and slightly, *A. hyrcanus*. Four species were susceptible to infection with *P. malariae*, namely:—*A. ludlowii*, *A. stephensi*, *A. culicifacies*, and *A. varuna*. Gland infection was observed in *A. ludlowii* and *A. stephensi*. Gland infections were found in 9 out of 54 *A. stephensi* which had been fed on patients infected with *P. malariae*. The proportion of gametocyte carriers that proved infective was:—*P. falciparum*, 67·6 per cent., *P. vivax* 40·0 per cent., *P. malariae* 21·2 per cent. *W. F.*

HARRISON (C. C.) & RAMSAY (G. C.). **Some Findings and Observations in a Malaria Survey of a Group of Tea Estates in the Eastern Duars District of Northern Bengal and Some Recommendations for the Reduction, Control and Eradication of Malaria in the Area Investigated. A Survey Carried Out under the Auspices of the India Branch, The Ross Institute, London.**—*Jl. Trop. Med. & Hyg.* 1933. Feb. 1. Vol. 36. No. 3. pp. 33–41. With 1 map & 1 chart.

This survey was made over a group of eleven tea estates in the eastern Duars, between October 1931 and September 1932. The results confirm Ramsay's earlier observations (this *Bulletin*, Vol. 27, p. 637, and Vol. 28, p. 579) that *A. minimus* is almost entirely responsible for the malaria of Assam.

It breeds in the clear water at the edges of slow-running streams, until the monsoon comes and makes them muddy, when it migrates to seepages and drains at higher levels. It selects breeding places near to human habitations. The soil of the Duars contains a high percentage of sand; consequently the streams are clear and sparkling. When the ground is disturbed, pools of clear water are often made. Such water is suitable for *A. minimus*, and agricultural operations in the Duars result in malaria, though they would be innocuous in a country where there was colloidal clay. The intense malaria of the Duars is almost entirely man-made and has been created by clearing, draining, pit-digging, and the importation of non-immune labour.

W. F.

RICE (E. Milford) & SAVAGE (J. de la M.). **Malaria Survey of Two Tea Estates in Upper Assam.**—*Records of the Malaria Survey of India.* 1932. Dec. Vol. 3. No. 2. pp. 219–252. With 3 graphs.

In this excellent report the authors show that needless felling of jungle has increased malaria on the two estates in question. They have drawn up a careful balance sheet demonstrating what malaria costs these estates in cash, and what it would be worth their while to pay in order to prevent 25 per cent. of it. Very clear recommendations for control are given.

The two Tea Estates A and B are situated in upper Assam, between 300 and 400 feet above sea level, near a large tributary of the Brahmaputra River; both are areas of hyperendemicity. Subtertian and benign tertian malaria occur in approximately equal proportions, with about 15 per cent. of quartan on estate B. *A. minimus* is the principal carrier: it was found plentiful only during the last three months of the year, and if this finding is substantiated by observations in future years it may mean that control can be limited to the last quarter of the year. Two specimens of *A. philippinensis* were found naturally infected with oöcysts, and this mosquito is possibly a carrier during the earlier months.

There has been a fairly heavy increase of malaria on both estates during the last five years, and this is attributed to jungle felling and the influx of non-immune labour. The drains on estate A were covered with jungle until 1928, the cutting down of this made them suitable breeding places for *A. minimus*, and there was a consequent rise in the malaria rate which is clearly shown in a graph. The same thing occurred on estate B, where the jungle was cleared in order to prevent Blister Blight, a disease of the tea bush, which is favoured by shade and is also parasitic on rhododendrons. It now appears that it was unnecessary to clear away the vegetation over the streams, because it neither shaded the tea bushes nor consisted of rhododendrons.

The authors have made out a balance sheet showing the number of deaths and days of work lost from malaria, and giving the value of these in money, taking the figure of £30 as the value of a coolie and the average value of his work as about 2s. 6d. a day. The annual loss on estate A worked out at £2,715. Adopting the "eight years purchase of profit valuation" they calculate that the capitalized value of the loss, due to malaria, is £2,715 × 8=£21,720. "Aiming at a 50 per cent. reduction in the malaria incidence, and being confident of a minimum of 25 per cent. reduction, we take the latter figure as a definite goal, thereby reducing the capitalized value of malaria for our present purpose to £5,430. We now suggest that the interest on this sum at 5 per cent., or £272, is the amount which can justifiably be expended per annum on reducing the incidence of malaria on Estate A." This estate comprises 714 acres, is valued at £53,550, and employs about 1,000 coolies. In the same way it was calculated that Estate B should spend £150.

The authors' recommendations come well within these figures. On Estate A they found that the only breeding place of *A. minimus* was the main estate drain, and they recommend that this should be oiled by anchoring bags of cotton waste, soaked in waste oil from the estate factory, on each side of the drain at intervals of 100 yards, and renewing them once a week. On Estate B anopheline breeding takes place in many places, and they do not consider that any expenditure for anti-mosquito measures should be made at present, as jungle will cover most of the areas if allowed to grow; they suggest in the meantime that the children and carriers should be treated with plasmoquinine in order to destroy gametocytes. *W. F.*

COVELL (G.) & BAILY (J. D.). **The Study of a Regional Epidemic of Malaria in Northern Sind.**—*Records of the Malaria Survey of India.* 1932. Dec. Vol. 3. No. 2. pp. 279–322. With 1 map, 1 plan & 13 graphs. [36 refs.]

An epidemic of malaria occurred in Northern Sind in the autumn of 1929; the precipitating cause was excessive rainfall, with flooding and an abnormally high relative humidity, following several abnormally dry years.

There had been no big epidemic for 12 years, and the results of spleen examinations showed that immunity was low. The spleen rate rose to 80 in the year after the epidemic. The prevalence of *A. culicifacies* was very high at the beginning of the outbreak, but few hatched out after the first 3 or 4 weeks. The sporozoite rate reached 30 per cent. at one period. Very few crescent carriers were found at the beginning of this epidemic, and it is difficult to see how infection spread, unless the anopheles had a very wide dispersion after feeding. The same phenomenon has puzzled other observers in other epidemics. The crescent rate rose rapidly and reached a high figure about 2 or 3 weeks after the epidemic had reached its highest peak; *i.e.*, about the 9th week. *W. F*

ABRAHAM (A. C.). **The Anopheline Mosquitoes of Hyderabad, Deccan, and their Control.**—*Records of the Malaria Survey of India.* 1932. Dec. Vol. 3. No. 2. pp. 179–195. With 1 map & 2 graphs.

Contains an interesting note on the water-hyacinth.

Hyderabad city comprises the ancient walled town south of the Musi River, and the more modern Chaderghat on the North. Within the walled city, there are more than 6,000 wells; *A. stephensi* is plentiful and 3·5 per cent. are infected; the spleen rate is 50 per cent. In Chaderghat, the spleen rate is only 10 to 25 per cent., and the carriers are probably *A. aconitus* and *A. culicifacies* which breed in the Musi River, on account of (*a*) innumerable pits and pools produced by excavation of sand from the river bed, and (*b*) the profuse growth of water-hyacinth. The water-hyacinth (*Eichornia crassipes*), a native of Brazil, has now become a pest in many countries into which it has been introduced. It can propagate itself by seeds, suckers, and lateral branches. It has been suggested that it would cover water so completely as to be useful in malaria control, but in Hyderabad it shelters larvae and mechanically interferes with the action of larvicides. Removal of the plant by hand is the method adopted. It is useful as fodder for cattle, as manure, as a source of potassium chloride, for the manufacture of paper, and for the preparation of ink from its flowers.

W. F.

VAUCEL (M.) & SALEUN (G.). Le paludisme à Brazzaville. [**Malaria at Brazzaville.**]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 18–23.

There has been an alarming increase, during the last two years, in the amount of malaria at Brazzaville, where it was formerly uncommon and where less than a dozen of the 600 Europeans suffered from fever during the year. The parasite index in native children was 26 per cent. in 1927, but now it is 93. *P. malariae* is the commonest parasite in the rains, and *P. falciparum* in the dry weather; *P. vivax* is not very rare. The common anopheline is *A. costalis.* *W. F.*

SICART (Marcel) & VILLAIN (Georges). Contribution à l'étude du paludisme dans le Cap Bon. [**Malaria in Cap Bon.**]—*Tunisie Méd.* 1932. Nov. Vol. 26. No. 9. pp. 429–446. With 6 figs. (1 map).

Cap Bon, the southern boundary of the Gulf of Tunis, is highly malarious. Quartan is the commonest fever in the northern and eastern parts of the peninsula, but, for some unexplained reason, it is much less common in the south and west. Money is not available for extensive drainage works. *W. F.*

GALLIARD (Henri). Culicidès du Gabon. IV. Essai sur leur biologie dans ses rapports avec le paludisme local. [**The Culicidae of the Gabon and their Relation to Malaria.**]—*Ann. Parasit. Humaine et Comparée.* 1932. Nov. 1. Vol. 10. No. 6. pp. 465–493. With 16 figs. on 8 plates & 1 map. [59 refs.]

These observations were made in the western Gabon, just south of the equator; except for a little grass land, the country is mountainous and covered with jungle. There is a dry season from June to September. The parasite index at the end of the rains was about 65 per cent. in children under 10 years of age and 8 per cent. in adults; in the dry season these figures were approximately halved. *P. malariae* accounted for 2 per cent. of the infections, the rest were due to *P. falciparum*. Seven species of anophelines, and 35 species of culicines were identified. The most numerous anophelines were *A. mauritianus*, *A. funestus* and *A. costalis*. The first was the most common, and was ubiquitous; it breeds in any water, running or stagnant, clear or weedy, exposed or shaded. *A. funestus* was found in the grass lands, and *A. costalis* on the coast. Mosquitoes were most common in houses at the end of the rains; none were caught during the dry season.

W. F.

MORIN (H. G. S.) & TOUMANOFF (C.). Sur le rôle de *Anopheles maculatus* dans la transmission du paludisme au Tonkin. [**The Rôle of *A. maculatus* as a Transmitter of Malaria in Tonking.**]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 83–92. With 1 fig.

It is impossible, owing to the difficulty of catching adults, to say definitely whether this mosquito is an important carrier of malaria in Tonking.

Two naturally infected specimens have been found among 45 examined in that area of Tonking which is known as the zone of intermediate altitude. This mosquito does not stay in houses during the day and it is therefore difficult to catch wild adults. The larvae are common in many places where malaria is prevalent, but they are also found in parts of the highlands where there is none. Local conditions which favour or hinder the contact of this mosquito with man may make it a carrier in one district, and harmless in another. Attention is drawn to the importance of day shelters for mosquitoes such as drains, ditches, banks, and bamboos in the neighbourhood of houses. *W. F.*

RUSSELL (Paul F.). **Malaria in the Philippine Islands.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 167–178. [2 refs.]

HOLT (Rufus L.) & RUSSELL (Paul F.). **Malaria and Anopheles Reconnaissance in the Philippines.**—*Philippine Jl. Sci.* 1932. Nov. Vol. 49. No. 3. pp. 305–371. With 1 fig. & 7 plates (3 maps). [60 refs.]

Thorough malaria-control by any of the approved methods is beyond the means of the Philippines. All the available methods should be employed as means permit, and, in time, there may be gradual improvement.

Malaria investigation is jointly supported by the Bureau of Science, Manila, and the Rockefeller Foundation. Dr. Russell considers that malaria is a disease of great, but not paramount, importance in the Philippines. There is no malaria on flat land, but it occurs where there is a change of altitude; there are thus two malarial zones, one where the coastal plain passes into the intermediate plateau, and another where the plateau rises into the foothills of the mountains. The coastal plain is non-malarious because it is flat; where hills rise gradually from it, it is malarious. There is no malaria above 2,000 feet. The disease varies with the seasons: when there is no rain, or when there is much, there is little malaria. "Transition seasons, between wet and dry and vice versa, like transition regions from lower to higher altitudes, are apt to be malarious in the Philippines." The carriers are the *funestus-minimus* sub-group. MANALANG'S "*A. funestus* is chiefly *A. minimus* var. *flavirostris*, but may sometimes include *A. mangyanus*." These mosquitoes breed among the bank-side vegetation of clear, gently-running streams, slightly shaded, in foothill areas. The salt water anopheline of the coasts (*A. litoralis*, King 1932. The salt-water *ludlowi* of earlier writers) though akin to the *ludlowi* of Malaya, does not carry malaria.

Paris green control, continuously applied, has been found relatively economical and effective. It is of proved value where people are concentrated in limited areas such as camps and the like, but for general application the cost is more than the people can afford. "It cannot be said that there has ever been demonstrated in the Islands a malarial-control project for typical small communities which was within the means of the people." Quinine and quinoplasmine will never control malaria; it is impossible to get a large group of civilians to take antimalarial drugs systematically, but they are adjuvants of value; there is no evidence that malaria control will ever be achieved in the Philippines without anti-larval measures. 'Not one but all available weapons must be utilized, and in time the incidence of malaria-carrying mosquitoes should be reduced. There is no more permanence in sight for malaria control than for road repairs. In the Tropics, at least, it must be carried out year by year during this century, and the next. "The tropics are generally poor in *money*, but rich in *time*."

W. F.

SOESILO (R.). Enkele grepen uit de malaria epidemiologie. [**Selections from the Epidemiology of Malaria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Jan. 17. Vol. 73. No. 2. pp. 67–74.

In this lecture the author deals with a number of practical points in epidemiological analysis and practice. Some of these may be noticed here.

The number of species of anophelines in the Dutch East Indies is about 46, but malaria-carrying mosquitoes are about 1-10th of this number. Moreover, the majority of these show very definite preferences for certain breeding places. In this way the task of malaria prevention by anti-larval measures is brought within compass by attention only to particular areas and particular species. In Batavia, for example, only the fishponds, in which the brackish-water *A. ludlowi* breeds, require treatment.

A characteristic of hyperendemic malaria is a high spleen index with a maximum (80–90 per cent.) reached at 2 years of age and persistence at that level. The parasite index is lower than the spleen index and is higher in children than in adults. Another characteristic of endemicity is that the percentage of gamete carriers is small. An example of these findings may be extracted from tables referring to chronically endemic areas of the island of Nias. Ninety-three children examined gave a parasite index of 50·5 per cent., a spleen index of 92·5 per cent. and 3 gamete carriers. The corresponding figures for 126 adults were 20·3, 90·5 and 0. The picture is quite another in a population previously free from malaria and in the grip of an epidemic. Here the parasite index is at first higher than the spleen index and just about equal in children and adults, while the gamete carriers are both numerous and not less in adults than in children. Absence of large spleens also points to fresh malarial incidence.

A permanently high spleen index among the adults living in a chronically malarial region is regarded as indication of the continued and efficacious parasiticide action of that organ, whilst the small number of parasite carriers is ascribed to the development of an immunity. These are not to be regarded as facts of necessarily universal application throughout all the world. *W. F. Harvey.*

JOURNAL OF THE PUBLIC HEALTH ASSOCIATION OF JAPAN. 1933. Feb. Vol. 9. No. 2. pp. 1–5.—**Malaria and its Prevention in Japan.**

Malaria is not a common disease in Japan proper. Its occurrence is limited to the summer, and it never appears in epidemic form. It is always of the benign tertian type, except in the Okinawa Islands where subtertian occurs. Quartan malaria does not exist. In Formosa, malaria is decreasing, but it is still one of the most important problems in public health, and malaria cases constitute more than 10 per cent. of all the patients treated at government institutions. In Korea, malaria is more prevalent than in Japan; during 1931, there were 1,583 deaths from it in a population of 21 millions. In the Kwantung Territory and the South Manchuria Railway Zones, the disease increases year by year. *W. F.*

GIGLIOLI (G.). **Some Statistical Data on the Incidence of the Various Malarial Parasites in the River Areas of the Interior.**—*Brit. Guiana Med. Ann. for 1932.* pp. 98–102.

Benign tertian is the most prevalent form in the river areas of the interior of British Guiana. It accounted for 81·4 per cent. of 1,247 cases of malaria examined at the Mackenzie Hospital. Subtertian was 15·7 per cent., and quartan 2·9 per cent. In reality, quartan is more common than this figure suggests; it is so mild that few cases come to hospital for treatment. The benign tertian season is from July to November; the subtertian season is in September; the quartan from October to May. *W. F.*

BOYD (Mark F.) & PONTON (Gerald). **The Recent Distribution of Malaria in the South-eastern United States.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 143–166. With 24 figs.

The distribution of malaria is correlated with the geology of the country. It is endemic in areas of "solution topography." The variations of intensity from year to year, within these areas, are correlated with the rainfall.

The distribution of malaria in this region is not related to its fluvial hydrography: the malarial zone bisects the river basins considerably above their points of discharge, but it coincides with the areas of "solution topography." These are areas underlain by soluble limestone which is gradually dissolved, in places, by the action of water, and as the result of this, extensive underground passages are formed, some of which contain underground rivers while others become dry caverns. Here and there the roof of a subterranean passage gives way, forming a steep-walled, funnel-shaped depression of relatively small diameter, which is known as a " sink " or " sink-hole." At first, these depressions may have a pool of water at the bottom, or a stream appearing at one side and disappearing underground again at the other. Gradually the sink becomes filled in, leaving a basin-shaped depression. These depressions which vary in size from a few hundred feet to several miles in diameter represent the last stages of solution erosion. Some are permanently filled with water, forming ponds or lakes, some remain dry except during heavy rain, in others an underground stream comes to the surface. In such country, there are no superficial erosion channels or river beds to run off the surface water, and in wet summers this collects in the numerous shallow, basin-shaped depressions devoid of outlet. This promotes the breeding of *A. quadrimaculatus,* and intensifies malaria. The water in the lime-sinks, in the sluggish streams flowing from some of them, and in many of the basins temporarily filled with water in wet seasons is alkaline. Such water is favoured by *A. quadrimaculatus* ; but in the sandy, flat woods where the smaller depressions are filled with vegetation the water is acid, and there *A. crucians* breeds. *W. F.*

BOGOJAWLENSKI (N. A.). Die Malaria im Distrikt Kasach (Aserbajdschan) nach langjährigen Beobachtungen. [**Malaria in Kasach District, Azerbaijan.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Jan. Vol. 37. No. 1. pp. 19–28. With 5 figs.

The work was done in the district of Kasach situated in the extreme north-western portion of the Soviet Republic of Azerbaijan. The population of 121,255 is chiefly rural, being distributed in 279 villages. The author describes the physical and economic conditions of the district. The important vectors of malaria are *Anopheles maculipennis* and *A. superpictus.* Whilst the breeding places of the former are ubiquitous, the latter is much more selective, having a strong preference for puddles in river beds. Both are equally zoophilic. There are grounds for believing that *Anopheles superpictus* is actively migratory up to 8 kilometres. For hibernation they select horse stables, which are warm and they get the blood required from the horses and other animals. The material for estimating the distribution of malaria in the districts was obtained from the results of the research expedition (10,712 persons) and the results of previous inspections (21,985 persons). The spleen, Ross and parasite indices were :—63·9 : 3·3 : 29·8 per cent. respectively. As regards the parasites the frequency was :—*P. malariae* 37·3 per cent., *P. vivax* 26·3 per cent., *P. falciparum* 24·7 per cent., undetermined species 9·2 per cent., mixed infections 2·5 per cent. In young children cerebral malaria was not uncommon. There are two peaks of malaria in Kasach, a small one April to May, probably relapse cases, and a second higher one in autumn, nearly all being primary infections. As regards the antimalarial measures, they commenced very simply, with therapeutic and prophylactic administration of quinine, and have gradually expanded to the other methods usually employed. For the special problem of the district, namely, the destruction of mosquitoes in the stables, they employed smoke, especially tobacco smoke, and in 1930 1,010 kg. of tobacco were used for the purpose. *E. D. W. Greig.*

PERALVO CABALLERO (Antonio). [Servicio Sanitario Profilaxis Antipalúdica]. Pantano del Guadalmellato. Junta Social. [**The Guadalmellato Swamp.**]—61 pp. With 17 figs. on 9 plates & 1 coloured folding map. 1930. Nov. Publicaciones de la Confederación Sindical Hidrográfica del Guadalquivir.

This brochure, published by the Guadalquivir Hydrographic Syndicate, contains a report of the bonification of the Guadalmellato swamp and its drainage, illustrated by self-explanatory photographs. The work was carried on during the six years, 1925–30 inclusive. All the labourers were given quinine, in doses varying from 0·5 to 1 gm. on two or four successive days, for adult males, women and children being given proportionately less. In 1925 there were 270 persons and 15 of them developed malaria, *i.e.*, 5·5 per cent.; in 1926 there were 61 infected among 300 (20·6 per cent.); in 1927, 17 among 470 (3·6); in 1928 there were 1,040 with less than a month's preventive treatment and 972 was the average during 5 months. Among the latter there were 17 cases or 1·7 per cent. infected. In 1929 26 cases among 1,309 (1·9), and in 1930, when the work was being completed, three cases among 310 (1·1 per cent.). Small individual estates are also described separately. Illustrations show the construction of canals, dams, bridges, etc., erected during the course of the work. *H. H. S.*

RAGAZZI (Giorgio). La malaria a Tauorga. [**Malaria in Tauorga (Tripolitania).**]—*Arch. Ital. Sci. Med. Colon.* 1933. Apr. 1. Vol. 14. No. 4. pp. 264–276. With 8 figs. English summary (7 lines).

The author describes the oasis of Tauorga and photographs show well the nature of the terrain. The population of the district is 3,190 and he examined rather more than one-third, 1,106. Among these he found 71 with *P. falciparum* in their blood (no other form of the parasite was seen), and 450 had enlarged spleen, an index of 40·7 per cent. Twelve per cent. of 500 specimens of mosquitoes caught in the market place were *A. mauritianus*. *H. H. S.*

DAVEY (T. H.) & GORDON (R. M.). **The Estimation of the Density of Infective Anophelines as a Method of Calculating the Relative Risk of Inoculation with Malaria from Different Species or in Different Localities.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 27–52. With 2 graphs.

The Anopheline Density is estimated by the following formula:

$$\frac{\text{Number of female anophelines captured} + x}{\text{Number of rooms examined}}$$

The figure thus obtained represents the average number of female anophelines found at the time of examination of the house, in the early mornings. The term x is "a previously estimated amount representing the number of anophelines which had left the houses before the time of their examination." In West Africa, where *A. costalis* and *A. funestus* are the carriers, few leave the house before dawn and x may be neglected.

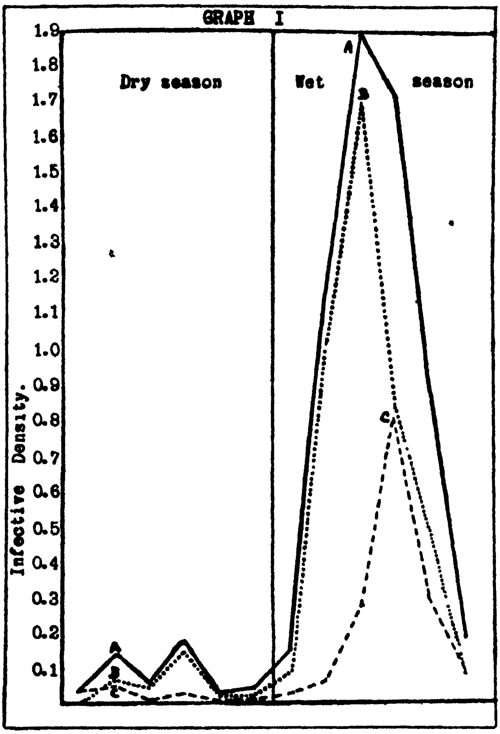
Since it is often impossible to dissect all the mosquitoes captured, the Anopheline Infective Ratio is estimated from the formula:

$$\frac{\text{Number of sporozoite infected anophelines}}{\text{Number of female anophelines dissected}}$$

The Infective Density, which is the average number of infective anophelines per room per day, is obtained by multiplying the Anopheline Density by the Anopheline Infective Ratio, thus :

$$\frac{\text{Number of female anophelines} + x}{\text{Number of rooms}} \times \frac{\text{Number of sporozoite infections}}{\text{Number dissected}}$$

The Infective Density is of considerable practical value, for example in cases where a medical officer has to choose between two sites for occupation by troops. Again, by its means the progress effected by antimalaria measures may be charted, and it allows an estimation to be made of the relative importance of different species of anopheles as carriers of malaria.



Showing the seasonal variation in anopheline infective density for all species at Kissy (A), and the parts played in determining it by *A. costalis* (B), and *A. funestus* (C).

The striking difference between infective densities in the wet and dry season is brought out, also the predominant part played by *A. costalis* in maintaining the infective density throughout the year.

[Reproduced from the *Annals of Tropical Medicine and Parasitology*.]

The Infective Density was estimated in Freetown, where anti-mosquito measures have been in force over a long period, and, by way of comparison, in the neighbouring unsanitated village of Kissy. In Freetown it was 0·024, while in Kissy it was 0·844, or 34 times greater. The human malaria rates, however, did not show the same difference ; 81 per cent. of the school children in Freetown were infected, as compared with 92 per cent. in Kissy. " With our present lack of knowledge regarding the duration of the primary attacks and the number and duration of the subsequent relapses, the estimation of the malaria incidence in the general population is of little value as an indication of the malaria inoculation risk in a community. . . . To ascertain what correlation exists between the anopheline infective density and the human malaria rate, we must conduct our investigations amongst that section of the population that is exposed to infection for the first time; that is to say, the non-immune newcomer to the district, or else the infant population during the first few months of life." The examination of infants under 3 months of age at Kissy, with an Infective Density of 1·29, showed that 52 per cent. were infected; but at Freetown, where the Infective Density was 0·031, only 5 per cent. were infected. With each few months of advancing age, the original difference steadily diminishes. "It is only a postponement of the disease; . . . as the child grows older parasites are to be found in its blood almost continuously, so that during these later years it is little better off than if it had lived in an unsanitated village. Whatever different views are held regarding the effect of anti-anopheline measures on the health of the native community, no such difference of opinion can exist regarding its value in preserving the health of the European." *W. F.*

ANDERSON (Drysdale). **Notes on Mosquito-borne Diseases in Southern Nigeria : IV. The Sex Ratio of House-Haunting Mosquitoes.**—*Jl. Trop. Med. & Hyg.* 1932. Nov. 15. Vol. 35. No. 22. pp. 340–343. With 4 graphs.

The author noted in the daily adult mosquito catches at Abeokuta and Onitsha, in Nigeria, that there was a considerable variation in the proportion of the two sexes according to the season and the species. He concludes that the sex ratio in the house catches is not fortuitous but is dependent upon the bionomics of the species. *W. F.*

ANDERSON (Drysdale). **Notes on Mosquito-borne Diseases in Southern Nigeria : V. The Spleen-Rate as an Index to Malarial Intensity.**—*Jl. Trop. Med. & Hyg.* 1933. Apr. 1. Vol. 36. No. 7. pp. 97–98. With 2 graphs.

The seasonal variation of the spleen rate gives only a gross indication as to the presence of malaria. In Boyd's method, the enlarged spleens are classified as 1, 2, 3, or 4 according to their size. The total of the spleens in each category is multiplied by the number of the category; and the four products are then added together giving what is known as the "weighted total." For example, if there were 5 enlarged spleens in each class, the weighted total would be $(5\times1)+(5\times2)+(5\times3)+(5\times4)=50$. The weighted total gives more accurate information than the simple spleen rate; but it is not entirely satisfactory because the spleens in class 2 are not twice the size of those in class 1, nor are those in class 4 twice the size of those in class 2. For scientific accuracy it is necessary to know the relation of the surface markings to the actual weight of the spleen. *W. F.*

KLIGLER (I. J.), MER (G.) & OLITZKI (L.). **Studies on Malaria. XI. Seasonal Variations in the Food Preference of** *Anopheles elutus*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 283–287.

Specimens of *A. elutus* were collected from houses and stables in the two settlements Yessod and Mellaha. The ingested blood was expressed on to filter paper and sent to the laboratory at Jerusalem for precipitin tests. The percentage of human blood was highest in May, June and November. There was a constant low incidence in April and early May which points to the possibility that, in colder climates, the feeding habits of anopheles differ from those in warmer ones. Climatic factors may account for the predominance of zoophilic races. *W. F.*

SCHWETZ (J.). Sur la répartition de trois espèces malariennes, suivant l'âge, chez les indigènes de l'Afrique équatoriale et centrale. [**The Species of Malaria Parasites Present at Different Ages in Natives of Central Africa.**]—*C. R. Soc. Biol.* 1932. Vol. 111. No. 40. pp. 1097–1099.

The intensity of infection diminishes with age. In infants, parasites are numerous ; in adults it is necessary to examine thick films in order to find any. Crescents are present in 50 per cent. of the infants, but are absent in adults. *P. malariae* is nearly as common as *P. falciparum* in infants, but after the age of 10 it is very rare. *P. vivax* is present in 5 per cent. or more of infants, but hardly ever in children over 3. (See SCHWETZ, below.) *W. F.*

SCHWETZ (J.). Le " mystère " de la fièvre quarte et de la tierce bénigne en Afrique Equatoriale et Centrale. [**The " Mystery " of Quartan and Benign Tertian Malaria in Equatorial and Central Africa.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1062–1074.

Referring to a paper by Professor MARCHOUX, " *La fièvre quarte et son mystère,*" the author states that, judging from his own experience in Africa, there is no more mystery attached to quartan than to benign tertian.

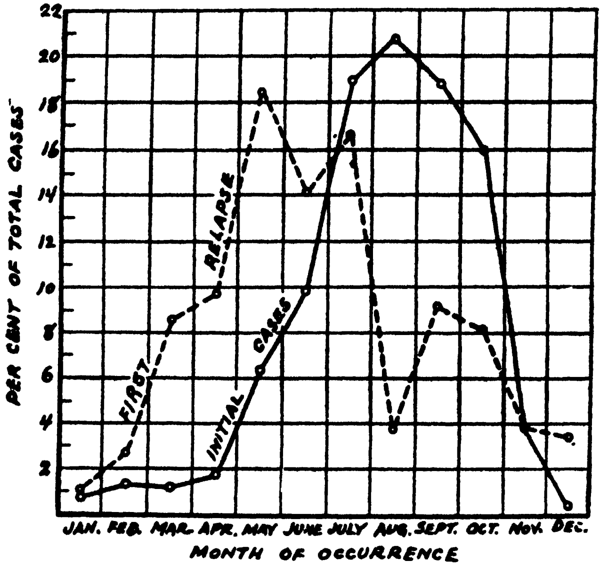
MARCHOUX pointed out that quartan differed from the other two forms of malaria in its more rapid disappearance from European countries ; its peculiar localization ; its presence in winter when mosquitoes are rare ; its frequence in Africans in certain parts of West Africa, while it seldom attacks Europeans living in the same places ; and he suggested that it might have an intermediate host other than the mosquito. The author, working at Stanleyville, has found benign tertian and quartan rare, both in native children and in Europeans. Benign tertian is even rarer than quartan, and he asks why this should be so. He suggests that it may be because the local carriers *A. costalis*, *A. funestus*, *A. marshalli* and *A. nili* are not so readily infected by *P. malariae* and *P. vivax* as by *P. falciparum*. He has noted that, as children grow older, *P. malariae* infections disappear earlier than those due to *P. falciparum*, and that *P. vivax* infections disappear still earlier, yet he has found *P. vivax* infections more resistant to quinine than infections with the other types. *W. F.*

GORDON (R. M.) & DAVEY (T. H.). **A Further Note on the Increase of *P. malariae* in Freetown, Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 53–55.

Quartan malaria is definitely established in Freetown and is becoming the predominant type among children. In children 3 to 14 years old, belonging to the native village of Kissy, 20 per cent. of the infections were *P. falciparum*, 41 per cent. *P. malariae*, 28 per cent. a mixture of the two, and 6 per cent. *P. vivax*. *W. F.*

BORDEN (William B.). **A Study of Malarial Relapses in the United States Army.**—*Amer. Jl. Hyg.* 1933. Jan. Vol. 17. No. 1. pp. 1–36. With 4 figs. [19 refs.]

A rise in the malaria admissions occurs in the spring before infected mosquitoes are to be found. It is concluded that this rise is due to latent infections and late relapses.



The occurrence of initial cases and first relapses of tertian malaria in the United States by months, showing that the maximum occurrence of first relapses is in May and of initial cases in August.

[Reproduced from the *American Journal of Hygiene.*]

The record of each man in the United States army who had suffered from malaria during the years 1922–1929 was scrutinized in order to determine if there was a seasonal variation in the occurrence of relapses. It was found that there were many readmissions and primary cases in the spring, though no infected mosquitoes are found before the second half of June. The primary cases occurring at this season must have been due to latent infections contracted during the summer and autumn of the previous year. The highest number of first relapses occurred in May, nine months after the highest number of primary cases in the previous year.

In benign tertian: after a first attack, 23·3 per cent. relapsed; after a first relapse, 25 per cent. relapsed; after a second relapse, 20·9 per cent.; after a third relapse, 22·2 per cent. [Which accords with the old rule that a quarter of the cases relapse after treatment with quinine at the primary attack, or at any subsequent relapse]. The relapse rate for primary cases of subtertian malaria was 17·9 per cent. There were no second relapses. Cases which received four or five weeks' treatment at the outset relapsed less than cases which received only three. *W. F.*

BOYD (Mark F.) & STRATMAN-THOMAS (Warren K.). **Studies on Benign Tertian Malaria. I. On the Occurrence of Acquired Tolerance to** *Plasmodium vivax.*—*Amer. Jl. Hyg.* 1933. Jan. Vol. 17. No. 1. pp. 55–59.

The authors' experiments corroborate the observation that infection with a given strain of benign tertian produces a tolerance to that strain, but not to other strains.

In the first experiment, two patients were bitten by mosquitoes infected with the McCoy strain of benign tertian, and both developed malaria. The attacks terminated spontaneously, and, two or three months later, they were again bitten by mosquitoes infected with the McCoy strain. Neither of them became infected, though sporozoites were present in the mosquitoes' glands and controls were infected. Parasites were still present in the blood of the two patients at the time of the second biting. In the second experiment, two patients were bitten by mosquitoes infected with the Vanse and the Cabler strains, respectively. After recovery, which was assisted by quinine, they were bitten again ; this time, by mosquitoes infected with the McCoy strain. They both became infected. Neither of the patients in the second experiment had parasites in his peripheral blood at the time of the second biting. [Therefore the conditions of the two experiments were not quite the same.] *W. F.*

BOYD (Mark F.) & STRATMAN-THOMAS (Warren K.). **Studies on** *Plasmodium vivax.* **1. The Microgametocytes as a Factor in the Infectiousness of the Infected Human.**—*Amer. Jl. Hyg.* 1932. Nov. Vol. 16. No. 3. pp. 845–850.

——. **2. The Influence of Temperature on the Duration of the Extrinsic Incubation Period.**—*Ibid.* pp. 851–853. With 1 chart.

During 1931, the authors examined 849 *A. quadrimaculatus* that had taken an infecting meal. Of these, 47·4 per cent. were found to be infected with *P. vivax.* They found that there were refractory individuals in every batch, and that this was not overcome by repeatedly feeding the mosquitoes on a patient. The proportion of mosquitoes becoming infected was not attributable to the number of gametocytes in the patient's blood, but the number of oöcysts in the stomachs of the mosquitoes which actually became infected was directly dependent on the number of microgametocytes.

Batches of *A. quadrimaculatus* incubating an infection of *P. vivax* were kept in cool incubators and each day those that died were dissected. The extrinsic incubation period was taken to be complete when sporozoites were first found in the salivary glands. The shortest incubation took place between the mean temperatures of 24·2° and 25·4°C., and occupied 11 days. Higher minimum temperatures were fatal to the mosquitoes. Between 19·3° and 21·6°C. the incubation was lengthened to 21 days. These circumstances would limit the transmission of *P. vivax* by *A. quadrimaculatus* during the extreme heat of midsummer. *W. F.*

CARLEY (Paul S.). **The Influence of Race in Malarial Splenomegaly in Panama.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 467–471.

Splenomegaly, as a sign of malaria, is more constant in the mestizo than in the negro. A group of Panamanian children comprising 598 negroes and 493 mestizos was examined. One-third of the cases of malaria in the negroes and one-fourth of the cases in mestizos had parasites without splenomegaly. Mestizos are persons of mixed white, Indian and negro blood, in whom white predominates. *W. F.*

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1932. Dec. Vol. 10. No. 4. pp. 485–601. With 16 figs.—Cours de paludologie de l'Institut Pasteur d'Algérie, 1932 (Sommaires). [**The Malariology Course at the Pasteur Institute of Algeria.**] [SERGENT (Edm.) et al.]

This is a collection of the excellent summaries which are handed to the students at the beginning of each lecture, or laboratory class.

The malaria course at the Institut Pasteur d'Algérie occupies 40 days and comprises 18 lectures followed by practical work in the laboratory, 6 demonstrations in the field, and two malaria surveys to be made by the student himself. Among the lecturers are MM. Edm. and Et. SERGENT, BÉQUET, DONATIEN, CATANEI, SENEVET, PARROT, BENHAMOU, FOLEY, and BALENSI. *W. F.*

RECORDS OF THE MALARIA SURVEY OF INDIA. 1932. Dec. Vol. 3. No. 2. pp. 269–270.—**Principles to be observed in the Preparation of Canal Projects and in their Execution.**

All channels, where possible, should be aligned along water sheds. The importance of providing for drainage should be borne in mind. The full supply of water should be as little as possible above the level of the adjoining land. Where canals cross natural drainage, arrangements should be made to pass storm water under or into the canal. No weirs should be constructed on rivers near towns, unless suitable provision is made to prevent water-logging. Borrow-pits, when they are necessary, should be dug in the canal bed. Main canals and branches should not be taken within 2 miles of an existing town, nor should new towns be built within 3 miles of them. Canal irrigation should not be permitted in areas likely to become water-logged, nor where the rise of the water table would be accompanied by the spread of alkali. *W. F.*

MEDICAL PARASITOLOGY AND PARASITIC DISEASES. Moscow. 1932. Vol 1. No. 2. pp. 65–116. [In Russian.]—**First U.S.S.R. Conference on the Use of Aeroplanes in the Control of Malaria.**

An account of the proceedings of a conference on the use of aeroplanes in antimosquito work, held in Moscow, November, 1931. The method of dusting mosquito-breeding places with Paris green from aeroplanes was first introduced in Russia in 1929, when 100 hectares were treated by this method. By 1931 this area was increased to 110,000 hectares. The papers read at the conference are devoted to questions of organization, technique and propaganda of the method, as well as to the results obtained in various parts of the country. The results appear to be so promising that it is intended to employ aeroplanes for mosquito-control on a much larger scale. *C. A. Hoare.*

LE FORZE SANITARIE. 1933. Jan. 10–20. Vol. 2. No. 1–2. pp. 1–132. With illustrations.—Numero doppio dedicato a "Littoria" ed alla bonifica dell' Agro Pontino. **[Bonification in Agro Pontino.]**

The first half of this double number is devoted to malaria in general and the measures of bonification undertaken in Agro Pontino in particular. The whole is illustrated by a beautifully reproduced plate of "Littoria" showing a bird's-eye view of the district in its improved, in fact renovated, state.

There is an introductory article on this area of the Agro Romano, followed by general remarks on the measures taken in hand since 1926. Succeeding articles are contributed by men whose names are household words in the world of malaria investigation.

Professor MARCHIAFAVA writes on the different parasites, their effects and the symptoms to which they give rise and he includes statistics on the mortality from this cause from 1887–1930 in Italy as a whole and by districts. Professor BASTIANELLI writes on the life-cycle of the plasmodium and on the treatment of malaria, while Professor MISSIROLI discusses the possibility of eradication.

A concluding section on the liberation of Agro Romano from the pestilence has already been reviewed [see below, p. 498]. The whole forms a very interesting and informative report. *H. H. S.*

DE LUCA (Benedetto). Sopra alcuni più recenti metodi di slatentizzazione della malaria. **(On Most Recent Methods of Reactivation of Malaria.)**—*Riv. di Malariologia.* 1932. May-June. Vol. 11. No. 3. pp. 301–307. English summary (7 lines) p. 413.

The author gives details of 20 cases of malaria, in ten of whom he tested the value of injecting 0·5 mgm. tuberculin to unmask a latent infection (Boeri's method) and in the other ten a series of injections, up to 6, of 10 cc. of a 10 per cent. solution of $CaCl_2$ intravenously (Monteleone's method). Of the first ten, 5 were infections by *P. vivax*, one by *P. falciparum*, and in 4 the infection is not stated ; 6 gave a positive result to the injection. Of the second series, 6 were *P. vivax*, 2 *P. malariae* and 2 were not determined, 7 of these gave a positive result. It is concluded that both methods are of value for the purpose.

H. H. S.

KORTEWEG (P. C.). Malaria tertiana als oorzaak van purpura haemorrhagica. **[Malaria as a Cause of Purpura Haemorrhagica.]** —*Nederl. Tijdschr. v. Geneesk.* 1933. Mar. 4. Vol. 77. No. 9. pp. 1011–1014. With 1 chart. English summary (5 lines).

The author gives an account of the development of purpura haemorrhagica in a patient of 20 years of age who had received the usual treatment with malaria blood subcutaneously.

This is a rare complication. The symptoms were vomiting, profuse menstruation, bleeding from the gums and from the nose and petechiae over the trunk and neck. The blood showed definite diminution of blood platelets. As the condition was serious treatment to terminate the malarial infection was necessary. Was this treatment to be quinine or neosalvarsan? Both are credited with provoking a haemorrhagic diathesis. Quinine, however, was used by intramuscular injection of 0·2 gm. hydrochloride and a cure effected of both the malaria and the purpura. *W. F. Harvey.*

ROBERT (Léopold), PLUCHON & DAREYS. Les albuminuries transitoires des paludéens. [**Transitory Albuminuria in Malaria.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 528–530.

It is important to remember, in countries where yellow fever occurs, that an attack of subtertian malaria is often accompanied by albuminuria. Six cases with *P. falciparum* in the blood and albumen in the urine were admitted to the hospital at Dakar during a period of 59 days. As the temperature came down in a few days with treatment, so the albumen disappeared from the urine. *W. F.*

LALL (Jiwan) & SINGH (Jamiat). **Urobilinuria and its Importance in Malaria.**—*Indian Med. Gaz.* 1933. Mar. Vol. 68. No. 3. pp. 139–141.

Four important conditions in the tropics in which urobilin is present in large amounts are in order of importance: malaria, resolving lobar pneumonia, internal haemorrhage, and cholecystitis. The largest quantity is found in malaria. Details are given of a method of estimating the quantity of urobilin in a colorimeter, by comparison with a standard solution of acriflavine. (See also this *Bulletin*, Vol. 28, pp. 141 and 1025.) *W. F.*

CHOPRA (R. N.), GUPTA (B. M. Das) & SEN (B.). **A Fatal Case of Severe Malignant Tertian Malaria.**—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 680–681. With 3 figs. on 1 plate.

More than half the blood cells contained parasites. Three hours after 5 grains of quinine had been given, the number of parasites had increased. Another 8 grains was given, but the patient died five hours later. The blood taken half an hour before death showed a heavy phagocytosis of parasites by the large hyaline and polymorphonuclear cells. *W. F.*

PINELLI (Anna). Un caso di malaria congenita. [**Congenital Malaria.**]—*Pediatria.* 1932. Dec. 15. Vol. 40. No. 24. pp. 1317–1321. [18 refs.]

The history of this patient is very clearly presented. A male infant, on the fifth day after birth when apparently in excellent health, had an attack of fever, temperature 38·4°C. This came down after a few hours, with a sweating, and after 24 hours' apyrexia rose to 39°C., falling similarly with a sweat. The mother had a similar attack at the same time and had suffered from malaria for three years.

Examination of the child showed a spleen extending two fingers'-breadths below the costal margin and the liver one. W.R. negative both in mother and child. The blood of the latter contained red cells 3,950,000, leucocytes 9,500 per cmm., Hb. 70 per cent. Numerous *P. vivax*, sporulating and gametocyte forms, were present. Quinine, 3 doses of 10 cgm., was given and when the next attack was due the fever was less. The drug was then given intramuscularly; after 3 injections the fever disappeared, spleen and liver were reduced and parasites were no longer found in the blood. The mother's blood also contained *P. vivax*.

The presence of parasites and particularly gametocytes in a child 5 days old excludes infection during or after birth and indicates *in utero* infection. *H. H. S.*

Chorine (V.). Un cas de paludisme congénital. [**A Case of Congenital Malaria.**]—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 952–953. With 1 chart.

The author found benign tertian parasites in the blood of a woman both on the day of her confinement and on the day before it. He also found them in the umbilical cord, and in the blood of the child some hours after birth. *W. F.*

Hakki (Adil) & Muhtar (Ahmet). Erfahrungen mit Chinoplasmin. [**Experience with Chinoplasmin.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Apr. Vol. 37. No. 4. pp. 173–175.

Four cases successfully treated. In two gametocytes were demonstrated by splenic puncture after treatment ; in two not. The authors say that they have confirmed the action of chinoplasmin on the gametocytes, and its superiority to quinine. *A. G. B.*

Jarvis (O. D.). **Further Researches into the Treatment of Chronic Benign Tertian Malaria with Plasmoquine and Quinine.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 627–631.

Major Jarvis, of the Malaria Treatment Centre, Kasauli, recommends a trial of routine treatment with 0·02 gram plasmoquine and 20 grains of quinine daily for a period of 14 days. He states that this treatment can be given to young British soldiers without any fear of toxic symptoms. He found that a 14-day course with 0·03 gram of plasmoquine was as good as a 21-day course with either 0·03 or 0·04 gram (a daily dose of 20 grains of quinine being given in each case). A 21-day course of 0·02 gram plasmoquine with quinine was as efficient in preventing relapse as a 14-day course of 0·03 gram of plasmoquine with quinine. The period of observation averaged 12 weeks.

Treatment.	Daily Dose × Days.		Total cases.	Relapse Rate, per cent.
	Plasmoquine gramme.	Quinine, grains.		
Quinine sulphate*	*Nil*	30 (max.) × 21–56	667	68·0
Plasmoquine†	0·08 × 28	*Nil*	22	22·7
Plasmoquine and Quinine‡	0·04 × 21	20 × 21	44	8·4
"C" (1930)	0·03 × 21	20 × 21	75	8·0
"C" (1931)			31	0·0
"C" Total			106	5·7
"F"	0·02 × 21	20 × 21	10	0·0
"J"	0·03 × 14	20 × 14	10	0·0

*Sinton and Bird, 1929. †Sinton and Bird, 1928. ‡Sinton, Smith and Pottinger, 1930. *W. F.*

Garcia de Cosa (Cecilia). La asociacion medicamentosa atebrina-plasmoquina, en el tratamiento do las fiebres estio-otoñales. [**Combined Atebrin and Plasmoquine in Subtertian Malaria.**]—*Medicina Países Cálidos.* Madrid. 1933. Jan. Vol. 6. No. 1. pp. 20–26. With 1 fig.

The author notes the frequent occurrence of toxic symptoms when these drugs are given together. When he uses the drugs separately he gives the plasmoquine with quinine, the course being 21 days for adults, 30 for children. To the former he gives for seven days 0·04 gm. plasmoquine with 1 gm. quinine [? salt], then quinine alone for a week, and the two together again for the third week. With atebrin alone, he gives 0·3 gm. daily in 3 doses for 5 days, 1·5 gm. in all.

When combining the two, he varies his plan, but he obtained the best results and the least subjective disturbance when the drugs were given on alternate days.

The number of patients treated was small, only seventeen. In 5 of them cure resulted after 5 days of plasmoquine; in one of them the gametocytes disappeared in 2 days. Of 9 who had the two drugs together, 8 exhibited gastro-intestinal disturbances and two of them relapsed. In 15 of the 17 the fever came down before the fourth day and did not return. The blood changes are worth noting; with plasmoquine an increase of lymphocytes at the expense of polymorphonuclears is usual, with atebrin there is eosinophilia and some neutrophilia with relative lymphopenia. With the two drugs together the plasmoquine effect predominates, lymphocytosis with neutropenia.

Toxic symptoms were chiefly gastro-intestinal—vomiting, diarrhoea, nausea, headache and in some violent colic—and also plasmoquine cyanosis, and a yellowish discolouration and epistaxis from the atebrin. It is not advisable, therefore, to give the combined treatment to patients with functional or organic gastro-intestinal or circulatory symptoms. *H. H. S.*

HOOPS (A. L.). **The Treatment of Malaria with Atebrin in Estate Practice.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol 26. No. 3. pp. 289–294.

The author finds atebrin cheaper than quinine.

Forty-three patients, comprising 25 subtertian, 15 benign tertian, and 3 quartan infections, were given 0·1 grams of atebrin three times a day for a period of five days. All recovered quickly, except one patient with subtertian who died fifty-four hours after admission, and none relapsed. Plasmoquine 0·03 gram daily was given in addition to subtertian cases. Four patients complained of pains in abdomen, and three showed a temporary, yellow discoloration of the skin. The usual course of quinine treatment on the rubber estates under the author's supervision requires a total of one ounce. This costs two shillings and fourpence, while a five-day course of atebrin costs only two shillings, requires less time, and is not so likely to be followed by relapse. Children stood the treatment well. *W. F.*

MAY (Walter J.). **Atebrin in Malaria.**—*South African Med. Jl.* 1932. Dec. 24. Vol. 6. No. 24. pp. 801–802.

Two daily doses of 0·1 gram of atebrin were given to 32 subtertian cases, 11 benign tertian, and 7 of mixed infection, for a period of 8 days. One patient who was suffering from subtertian died on the fourth day with parasites still present. In two other cases the temperature did not settle down quickly, but in the remainder it came down in one or two days and remained without subsequent rise. In 32 cases which were followed up, there were 5 relapses; and the author thinks that larger doses would probably give better results. *W. F.*

JOLLEY (P. G. E.). **The Results of Atebrin Treatment in Malaria.**—*Malayan Med. Jl.* 1932. Dec. Vol. 7. No. 4. pp. 129–131.

Six cases of benign tertian, two cases of subtertian, one of quartan, and two of mixed benign and subtertian infection, were given 0·1 gram of atebrin three times a day for 5 days. The subtertian cases were given plasmoquine 0·03 gram daily for 5 days in addition. Parasites and symptoms disappeared quickly and none of the patients relapsed during 40 days of subsequent observation. *W. F.*

CHATTERJEE (Sarasi Ranjan). **A Review of Six Cases of Malaria treated with a Erion (Atebrin).**—*Calcutta Med. Jl.* 1932. Sept. Vol. 27. No. 3. pp. 60–63.

Five cases of benign tertian and one of subtertian were treated for 4 or 5 days with 0·3 gram of atebrin daily. Parasites disappeared within two or three days, and in two cases which were under observation for six months there was no relapse. *W. F.*

CHOPRA (R. N.). **Cyanosis after Plasmochin.**—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 26–27.

A European, aged 28, was given an average daily dose of 0·05 gram of plasmoquine for 5 days. He suffered from severe pain in the epigastrium, back and neck, and from cyanosis which persisted for 9 days. No methaemoglobin could be detected in the blood. The resistance of the blood cells to haemolytic agents was increased. *W. F.*

LEAGUE OF NATIONS. HEALTH ORGANISATION. **Enquiry into the Quinine Requirements of Malarial Countries and the World Prevalence of Malaria.** L.o.N.P. III. Health. 1932. III. 3.—89 pp. Geneva. [Allen & Unwin, Ltd., 40 Museum Street, London, W.C.1.] [3s.; $0·75].

The Committee estimates the quinine requirements of the world at 1,387,411 kilograms per annum.

The Health Organization asked the health departments of malarial countries, by means of a circular letter dated January 14th 1931, for certain particulars relating to malaria, especially as regards the prevalence of the disease, the amount of quinine imported annually, and the amount which would be required to meet all the needs of the country. The data, which have been supplied by 93 countries, form a unique collection of material; they have been studied by a Reporting Committee consisting of Professor NOCHT, Professor PITTALUGA, and Dr. A. T. STANTON, and also by the Alkaloids Sub-Committee of the Malaria Commission. The Health Committee is of opinion that they may form the basis of a future conference on quinine.

The total number of cases treated in the countries concerned, during the last year of the enquiry, was 17,750,760; an increase of more than a million over the average for recent years, which is attributed to the development of health services and anti-malaria organizations. Though the number of cases receiving treatment has increased, it still falls short, by many millions, of the number standing in need of it. In India, out of 100 million malaria cases, only 8 to 10 millions are treated, and the quantity of quinine distributed does not exceed 2 grams per annum per case treated; there are many other countries where the conditions of treatment are similar. The Committee concludes that the world consumption of quinine is still far below the minimum necessary, and, estimating on the basis of a standard dose of 20 grams per case per annum, they arrive at the figure of 1,387,411 kilograms as representing the total amount required annually. *W. F.*

LANCET. 1933. Mar. 11. pp. 537–538.—**The Production of Quinine.**

Messrs. Howards & Sons state that the quinine industry could supply all the quinine which the League of Nations estimate as necessary for the whole world.

The Health Organization of the League of Nations, having estimated that 1,387,000 kilograms of quinine per annum is required for the treatment of all malaria patients in the world (see above), the question has been raised whether such a demand could be met by the quinine industry. Messrs. Howards & Sons affirm that it could. The normal sales of the 14 principal factories are about 500,000 kilograms yearly. With their existing plant they could double this output. Large stocks of quinine are kept in stock, and while these were being drawn upon, extra plant could be erected. Huge stocks of bark are also held, and the cinchona plantations are at present collecting only about half of their possible harvest. The difficulty is wholly economic. No world shortage of the drug exists, but the peoples and governments of malarious countries cannot afford to buy it in adequate amounts.

W. F.

LEGER (Marcel). Le paludisme, comme la syphilis, est justiciable d'un traitement continu et non de cures intermittentes "d'entretien." [**The Treatment of Malaria should be Continuous.**]—*Arch. Inst. Prophylactique.* 1933. Vol. 5. No. 1. pp. 76–101. [36 refs.] English summary.

The author's thesis is that relapses are the result of faulty treatment, and can be avoided by his method of continuous treatment over several months.

He considers that each of the three species of plasmodium has its own site of election in the body: for *P. vivax*, this is the spleen; for *P. falciparum* it is the central nervous system; for *P. malariae* it may be the bone-marrow or the kidneys. When, late in the disease, these strongholds are occupied, longer treatment is necessary than in primary attacks. The treatment recommended for subtertian malaria consists of alternate courses of quinine and plasmoquine, continued for 3 months if it is a primary attack, or for 5 months if it is not. A similar treatment is prescribed for quartan malaria, but the duration is longer; namely 5 months for a primary, and 7 months for a later attack. The duration of treatment for benign tertian is the same, but, in this form of malaria, stovarsol is employed in addition to plasmoquine and quinine. [The stumbling block would be the patient; even though the author does not favour the brutal method of giving quinine in solution.]

W. F.

MASSIAS (C.). Le 710 et le quiniostovarsol dans le traitement du paludisme à *Plasmodium vivax* et à *Plasmodium praecox.* [**Quiniostovarsol and 710 in Malarial Treatment.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 433–438. With 4 charts.

The daily quantities recommended are 1·0 gram of quiniostovarsol and 0·08 gram of 710, divided into two or more doses and given before meals. A course lasts 7 to 10 days, and there should be an interval of at least 7 days before it is repeated. The drugs must be stored carefully, especially in hot countries, and they are best dispensed in compressed tablets. The treatment was given to 6 benign tertian and 4 subtertian patients, with the result that the parasites quickly disappeared. The Annamite patients refused to stay in hospital more than a few days, and the action of the drugs on crescents was not very clear. There was no vomiting.

[There are several dangerous misprints in this article : a daily dose of 0·88 gram of 710 is recommended in one place, when obviously 0·08 is intended ; in another place, it is stated that a patient took 8·20 grams of 710 in 3 days. In both instances the figure 8 appears to have been printed in place of 0.] *W. F.*

SAUTET (J.). Traitement du paludisme par le 710 et le 574 associés ou non à la quinine ou au quiniostovarsol. [**Treatment of Malaria with 710 and 574 Alone and in Association with Quinine or Quiniostovarsol.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1074–1091. With 6 charts.

The author concludes that Fourneau 710 in association with quiniostovarsol is the best treatment for all three forms of malaria, and brings about rapid disappearance of crescents. His results with Fourneau 574 were not so good.

He recommends the following doses :—One cachet containing 0·02 gram of 710, and 0·25 gram of quiniostovarsol, four times a day ; two courses, each of 7 days duration, with an interval of 5 days between. One batch of cachets was highly toxic, but the others produced no side effects except giddiness in susceptible persons. Fourneau 710 in association with quinine also gave good results, but when it was given alone, it failed to destroy the parasites. Fourneau 710 is diethylamino propylaminomethoxy quinoline, and 574 is the corresponding dimethyl derivative. [Clinical notes of the treated cases are given, but they are rather difficult to follow, and it is not easy to see how the author reached the conclusion that crescents are quickly destroyed by 710 and quiniostovarsol.] *W. F.*

BEVIL (H. G.). **Hydroquinidine in Malaria.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 473–476.

Hydroquinidine was given to 16 cases of malaria with immediate results at least equal to quinine and without toxic side effects. In one case 10 grains were given daily for 48 days, followed by 5 grains daily for a further period of 25 days. Hydroquinidine is a dextro-rotatory alkaloid derived from cinchona bark ; it differs from quinidine only in containing two more atoms of hydrogen. It is an almost constant impurity of quinidine. *W. F.*

ROBERTS (A. M.) & LEACH (C. W.). **Quartan Malaria. Report of Case. Treatment with Quinidin Sulphate in a Patient Hypersensitive to Quinin.**—*California & Western Med.* 1932. Nov. Vol. 37. No. 5. pp. 315–317. With 1 fig. [25 refs.]

Records a case of quartan malaria in California, in a patient hypersensitive to quinine, and his successful treatment with quinidine (this *Bulletin*, Vol. 29, p. 352).

A dose of a quarter of a grain of quinine sulphate, by the mouth, was followed 20 minutes later by vomiting, itching, erythema, urticaria and lachrymation. The symptoms were relieved by an injection of adrenalin.

W. F.

KIKUTH (W.). Chemotherapeutische Versuche mit neuen synthetischen Malariamitteln in ihrer Bedeutung für die Bekämpfung der Malaria. **[Chemotherapeutic Experiments with New Synthetic Malarial Remedies.]**—*Zent. f. Bakt.* I. Abt. Orig. 1932. Vol. 127. No. 1/3. Beiheft pp. 172*–178.* With 2 figs. on 1 plate.

The author found that when he employed a haemoproteus infection in the finch for testing his synthetic malarial remedies he got much more satisfactory results than when he used the *Plasmodium praecox* infection of canaries for the purpose.

The advantage of the haemoproteus infection is that in many respects it is analogous to the *Plasmodium falciparum* infection of man. The gametocytes are found in the peripheral blood and have a certain resemblance to the crescents of *P. falciparum*. The asexual forms are not found in the peripheral blood, but inhabit the endothelial cells of the internal organs. By using this infection as a test he was able to bring out quite clearly the now well known differences in action of quinine, atebrin and plasmoquine. His experimental findings have been fully confirmed by extensive clinical trials of the drugs. He considers that atebrin has very definite therapeutic advantages over quinine. *E. D. W. Greig.*

BAKER (J. N.) & GILL (D. G.). **Plasmochin in Malaria Prevention. Experiments in Alabama.**—*Public Health Rep.* 1932. Dec. 2. Vol. 47. No. 49. pp. 2245–2250. With 1 chart.

The authors conclude that plasmoquine compound in a dose of one or two tablets a week, administered to all the inhabitants of a district, will materially lessen the incidence of malaria. Each tablet contains 0·01 gram of plasmoquine and 0·125 gram of quinine.

Two rural areas were chosen in Alabama, and from June to October every person was given one tablet every week. In 1929 the attack ratios per 100 had been 73 and 62 ; in 1930 they were 18 and 6. In two control areas the figures were 73 and 35 in 1929, and 31 and 7 in 1930. In 1931, another area was chosen and one tablet was given twice a week from June to November. The attack rate in this area was 20 in 1930, and 3·5 in 1931. In the control area it was 12 in 1930, and 9 in 1931.

W. F.

RICE (Justus B.). **Experiments on Plasmoquine as a Prophylactic among West African Negroes exposed to Bites of *A. costalis* infected with Subtertian Malaria.**—*Ann. Trop. Med. & Parasit.* 1932. Dec. 16. Vol. 26. No. 4. pp. 555–576. [10 refs.]

The author finds that 0·03 gram of plasmoquine a day can be taken for several months without any untoward symptoms, and that a daily dose of 0·023 gram will protect a man weighing 10 stone 10 lbs. against subtertian malaria.

These experiments were carried out on 42 Africans and one European in Liberia. The volunteers were first given a course of plasmoquine and quinine in order to insure that the blood was free from naturally acquired infection. Plasmoquine was then continued in various doses, and, after the volunteers had been taking it for a month or more, they were bitten by *Anopheles costalis*, which had been infected in the laboratory with *P. falciparum*; the plasmoquine was then continued for at least another month. It was found that daily doses above 0·34 milligram per kilo of body weight were sufficient to protect. The plasmoquine was given as a single dose each day, after the noon meal, and appeared to be effective over the 24 hours. Most Europeans in Liberia contract malaria during the first three or four months of residence, in spite of quinine prophylaxis; but two who have taken regular daily doses of plasmoquine, since their arrival 14 months ago, have remained free.

One reason why the author's results were so much better than SWELLENGREBEL'S (this *Bulletin*, Vol. 29, p. 37) may be that plasmoquine is a better protector against subtertian malaria than against the benign tertian strain employed by SWELLENGREBEL. It must also be remembered that these experiments were carried out on members of an African population saturated with malaria from childhood, and it is possible that larger doses are required to protect those who have never been infected before. *W. F.*

STRICKLAND (C.) & ROY (D. N.). **The Prophylaxis of Malaria by Drugs.** —*Parasitology*. 1933. Feb. Vol. 25. No. 1. pp. 77–86.

The authors conclude "that there is no prophylactic drug action against sporozoites demonstrated for malaria, and the effects hitherto observed must be considered to be a therapeutic action of the drugs on the parasites developing in man."

Quinoplasmine given to seven volunteers before they were bitten by infected *A. stephensi*, did not prevent malaria, though in one case where 0·1 gram of plasmoquine and 45 grains of quinine were given within 31 hours of the biting the incubation was delayed to the nineteenth day, and the attack was modified. Quinoplasmine given before and soon after the biting also failed to prevent infection. Similar experiments were made with quinine. Fifty-four grains given within the 48 hours before the biting did not prevent infection, nor did 5 grains daily for 14 days after the biting. *W. F.*

SOESILO (R.), GILBERT (A. P. W.) & BAGINDO (Zahar Gelar Soetan). Een en ander over malariaprophylaxe en Atebrin (eerste mededeeling). [**Notes on Malaria Prophylaxis and Atebrin.**]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1933. Jan. 31. Vol. 73. No. 3. pp. 153–170. With 9 figs. [28 refs.]

The field traversed in this article is not restricted to the use of atebrin, but the most important part is the work done by the authors with atebrin prophylactically and therapeutically.

Volunteers were infected by the bite of certainly infective mosquitoes (*A. subpictus*), which had received their infection from patients showing not less than 5 gametes per 1,000 leucocytes. The results as summarized, were :—(1) Six out of 21 volunteers treated prophylactically with atebrin and bitten by infected mosquitoes showed parasites in their blood after 12 to 24 days and rise of temperature after 15 to 24 days. (2) Ten out of 11 volunteers receiving no atebrin (controls) showed parasites in their blood after 8 to 13 days and rise of temperature after 10 to 14 days. (3) Seventeen infected volunteers were treated with 100 mgm. atebrin thrice daily for 5 to 6 days. In 4 of these the treatment was begun before and in 13 after the appearance of fever. Frequent examinations for 2 to 4 months in 13, and for one month in 3 of these, after the stoppage of the treatment, showed neither schizonts nor gametes. One person only of the 17 treated developed fever with parasites about two months after the last dose of atebrin. No objectionable symptoms were met with. (4) Atebrin acts quickly upon tropica rings and mature schizonts and appears to prevent gamete formation. (5) Two patients, having naturally contracted tertian malaria, were successfully treated with atebrin. *W. F. Harvey.*

STAUDT (H.). Sur la quininisation préventive au Katanga. [**Prophylactic Quinine at Katanga.**]—*Bull. Méd. du Katanga.* 1932. Vol. 9. No. 5. pp. 121, 123–8, 131.

Quininization of native children promotes their well-being, and reduces sickness and mortality, but it does not cure them or prevent re-infection, and cannot solve the problem of malaria. The best results are obtained by the administration of 8 grains a day for 15 days, followed by a continuous preventive treatment of about 4 grains a day. This is for children between 5 and 15 years old. *W. F.*

GORDON (R. M.) & DAVEY (T. H.). **A Note on the Value of Issuing Free Quinine to Native Infants.** [Miscellanea.]—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. p. 179.

It has been the custom to supply euquinine for all infants brought to the clinic, Freetown The results of examining the blood of such infants, and of controls who had received no quinine, have shown that the percentage of children infected with malaria is practically the same in the two groups. This method of supplying quinine to be taken home and administered by the mother is obviously unsatisfactory. Probably it is not given to the infants. *W. F.*

CORRADETTI (Augusto). Le reazioni di Henry nell' infezione malarica. (**Henry's Reactions in Malaria.**)—*Riv. di Malariologia.* 1932. May–June. Vol. 11. No. 3. pp 282–300. [71 refs.] English summary p. 413.

The author records his personal experiences with these tests in a considerable number of patients infected with different forms of malaria plasmodium. In all cases he employed both the Ferro- and the Melano-flocculation. His findings may be summarized as follows :—

Of 55 patients actually suffering from malaria—19 with benign tertian, 32 subtertian, two with both these, one with quartan and one with benign tertian—the only ones giving a negative with both tests were 3 subtertian and one benign tertian infections ; 5 gave a negative ferro-flocculation with positive melano-flocculation, 3 subtertian, one natural benign tertian and a general paralytic in his sixteenth attack after inoculated *P. vivax.* None gave a positive ferro- with a negative melano-flocculation.

. Of 25 chronic malaria patients 19 gave a double positive, 3 a double negative, and 2 a negative ferro- with positive melano-flocculation.

Of 13 patients suffering from various affections unconnected with malaria but giving a history of malaria long previously, one only gave a double positive, all the rest was negative to both.

Of 63 from whom no history of past or recent malaria was obtainable, three gave a double positive, two cases of leucaemia and one of pernicious anaemia ; two others with a history of infection 7 and 13 years ago gave a negative.

The author concludes that :—

1. The reactions are specific of malarial infection [there were three exceptions in the blood conditions mentioned above].
2. If the blood is taken during the fever or during digestion the reaction may be weak or negative.
3. Treatment by quinine may make it negative, even during an attack, but in chronic malaria, it remains positive in spite of quinine.
4. If there is a strong suspicion, on clinical grounds, that the condition is malarial, the test if negative should be repeated. *H. H. S.*

TRENSZ (F.). Recherches sur la " séro-floculation palustre" (réaction de Henry). [**Henry's Reaction.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. Dec. Vol. 10. No. 4. pp. 443–463. With 3 figs.

Henry's reaction is not specific ; it is positive in trypanosomiasis and leishmaniasis. The flocculation is not a reaction between melanin and its antibody.

It is uncertain whether repeatedly negative Henry tests mean that a patient is definitely cured. HENRY himself states that where the infection is latent and inactive the test may be negative. The author tested 12 healthy men who had suffered from malaria in the past, but had had no manifestations for several years. Eleven were negative ; the twelfth, who had not had an attack for six years, gave a faintly positive reaction and, several weeks later, he had an attack of benign tertian. HENRY considers that the melanin and the ochre pigment produced in malaria act as antigens (" endogens ") and produce specific antibodies which flocculate with his artificial melanin and iron solutions. The author denies that the reaction is due to these antibodies, or that it is specific. He has found it positive not only in malaria, but also in other protozoal diseases in which no melanin is produced, namely trypanosomiasis and leishmaniasis (Vol. 29, p. 715). He attributes it to an instability of the serum which occurs in protozoal diseases. In 11 guineapigs inoculated with trypanosomes (*T. berberum*) the reaction became positive soon after the appearance of trypanosomes, and as the reaction became stronger, " surflocculance " occurred in 6 of the control tubes containing only distilled water and serum. The difference between the flocculation in the tubes of test, and the " surflocculance " in the control tubes, is only a matter of degree —Henry's reagents assist the flocculation. Henry's reaction is useless as a measure of the amount of malaria in a district. The author examined the inhabitants of a native village and found that while the spleen and parasite rates rose in the malaria season, the positive Henry tests decreased ; again, while the spleen and parasite rates decreased with age, the positive Henry tests increased. *W. F.*

TZECHNOWITZER (M. M.), GORCHOWA (E. L.) & MOLDAVSKAJA-KRITSCHEWSKAJA (W. D.). Die Melanoflockulation bei Malaria. [**Melanoflocculation Reaction in Malaria.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Dec. 15. Vol. 126. No. 5/6. pp. 419–427. With 2 figs. [11 refs.]

In the reaction of melanoflocculation, RMF, the authors employed the choroid of rabbits' eyes in place of the choroid from the eye of the ox, and found it equally efficient as a source of antigen. Also they determined experimentally the most suitable dilution of saline for use with the antigen and found that 1–750 gave the best results. They worked out a simplified scheme for the reaction, which is shown in the following table :—

No. of test tube.	Antigen in NaCl 1–750	Serum	NaCl 1–750
1	0·25	2 drops	—
2	0·25	—	2 drops
3	—	2 drops	0·25

The RMF was tested in 1,220 sera, but critically analysed in 998 cases only. 736 of the cases were malarial infections and the remainder were cases of other diseases. Of the 736 cases of malaria, 432 patients attended the hospital of the Institute in the Ukraine, 290 were examined during the expedition to Melitopol, 14 were cases of malariatherapy. Of the 432 cases, 93 were primary infections, 153 were relapse cases, in the remainder the diagnosis was from history only. Of the primary infections 92 were tested and the RMF was positive in 89 (96·7 per cent.) ; in 48 of the cases of primary infection the parasites found in the blood were, 45 *P. vivax*, 1 *P. falciparum*, 1 mixed ; the RMF was positive in all these cases. In 153 cases of relapsing malaria the RMF was positive in 136 (86·2 per cent.), negative in 17 (13·8 per cent.) ; parasites were found in the blood of 66 relapse cases and in all, except one case, the RMF was positive. In 187 cases, in which the diagnosis was based only on the history, the reaction was positive in 17 (9 per cent.), doubtful in 30 (16·2 per cent.), negative in 140 (74·8 per cent.). During the Melitopol expedition there was an agreement between the positive RMF and the finding of parasites in the blood in 94·4 per cent. of the cases. The conclusion is drawn by the authors from their observations that there is almost complete correlation between the presence of parasites in the blood and the occurrence of a positive RMF, which varies from 94·2 to 99 per cent. ; therefore the RMF must be looked upon as pathognomonic for malaria. Of control sera 47, sent for Wassermann test, were investigated and 17 (42 per cent.) gave a positive RMF, but of 341 malarial sera tested for W.R., 11·1 per cent. were positive ; further, in syphilitics it is not possible to exclude a concomitant malarial infection.

The RMF was found negative in a large series of cases, viz., syphilis, tuberculosis, carcinoma, typhoid, erysipelas, dermal leishmaniasis, as well as in series of septic infections ; in typhus it is distinctly positive.

This serological index, which the authors consider of great importance from the epidemiological point of view, was applied to two villages of the Melitopol district, one heavily and one moderately infected with malaria. The following table shows the results.

Indices of amount of malaria.	Parasites in 135 persons.	Spleen in 218 persons.	History in 203 persons.	Serological in 290 persons.
Heavy ...	53·2	59·5	92·7	83·5
Moderate ...	7·1	7·1	64·2	57·1

The authors point out that the table shows clearly that the serological index and history are in close correspondence.

E. D. W. Greig.

CHORINE (V.). Réaction de Henry dans le diagnostic du paludisme. **(Henry's Reaction in the Diagnosis of Malaria.)**—*Riv. di Malariologia.* 1932. May–June. Vol. 11. No. 3. pp. 273–281. [30 refs.] English summary (7 lines) p. 413.

The author concludes that a repeatedly negative reaction signifies the absence of malaria infection, a positive reaction indicates its probability, but does not permit its definite diagnosis. A table is given showing the lay-out of the tubes for the test.

An excellent and concise review of the subject is given. The reaction is negative during the malaria paroxysm because the antibodies are fixed by the melanin and iron pigment derived from the rupture of the schizonts. It is positive in diseases other than malaria, in which intense and rapid blood destruction occurs. TRENSZ (above) has found it positive in guineapigs with trypanosomiasis, and in dogs with leishmaniasis. The author examined : (1) Old war cases of malaria 49 : negative 46 ; positive 3, melanoreaction strongly positive, ferroreaction feeble or negative. No parasites. (2) Persons more or less recently returned from the Colonies 67 : 63 negative ; 4 positive, and parasites found in two of these. (3) General paralytics inoculated with benign tertian and treated with quinine 21 : 8 negative, all free from parasites ; 13 positive, 5 with parasites. *W. F.*

CHORINE (V.). Evolution de la réaction de Henry et surfloculance du sérum. **[The Development of Henry's Reaction. Surflocculance.]**—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 269–273. With 1 fig.

Henry's reaction appears soon after the inoculation of malaria, rises to a maximum, and disappears during quinine treatment.

The reaction was studied in general paralytics inoculated with *P. vivax.* The first paroxysm usually occurred 2 to 10 days after the inoculation. Henry's melanoreaction became positive on the 3rd or 4th day, irrespective of whether a paroxysm had occurred or not. The ferroreaction appeared later. The intensity of the reaction increased until the 6th or 7th paroxysm. When quinine was given, the reaction remained stationary for 12 days ; it then declined and disappeared in about 35 days. The reaction became negative during each paroxysm, and appeared again 4 hours later. When the serum was heated for half an hour at 60°C. it no longer reacted. The author does not agree with TRENSZ (above) that the flocculation of malarial sera in distilled water (*surflocculance*), and Henry's melanoreaction are manifestations of the same phenomenon, differing only in degree. *W. F.*

HENRY (A. F. X.). Mélanofloculation. Formolage des tubes témoins ; alcalinisation des liquides de dilution. **[Formalin and Alkalization in Melanoflocculation.]**—*C. R. Soc. Biol.* 1933. Mar. 3. Vol. 112. No. 8. pp. 765–768.

The stock solution of melanin for Henry's reaction is preserved by the addition of 0·5 per cent. formol. This solution is diluted 1 in 10 during the test, so that the final strength of formol is only 1 in 2,000.

The author used to add formol in corresponding quantity to the control tubes, but he abandoned the practice because it introduced complications and was generally unnecessary. He now points out that kala azar sera are gelidified in the tubes containing melanine, because of the formol in it. In places where there is kala azar it is therefore necessary to have formol in the control tubes in order to avoid the reading of false reactions. To avoid the production of acidity, 0·25 cc. of N/100 caustic soda should be added to each 100 cc. of the distilled water and of the saline water used in the reaction. *W. F.*

MEERSSEMAN (F.) & LACOUR (P.). Recherches sur la réaction de la malaria-floculation de Henry. [**Henry's Reaction.**]—*C. R. Soc. Biol.* 1933. Mar. 10. Vol. 112. No. 9. pp. 908–910.

The authors bring forward evidence to show that the reaction is specific and does not give positive results in other diseases, not even in trypanosomiasis.

They insist on careful technique. The test should be made simultaneously in distilled water and in saline, 1 in 1,000 for the ferro-flocculation, and 1 in 3,000 for the melanoflocculation. The reaction is more sensitive in the distilled water; the salt solution is of value in cases where the serum flocculates spontaneously with water. The reaction tubes should be formolized to the same titre as the antigen, in the melanoreaction. Their results were as follows: (1) 22 cases of malaria with parasites in the blood gave 22 positives. (2) 23 cases with enlarged spleens, but free from parasites and without attacks for at least 6 months, gave 22 positives. (3) 37 cases who had suffered from malaria during the war, but had not done so later, gave only 2 positives. The controls were as follows: (*a*) 13 healthy persons gave no positives; (*b*) 40 persons with respiratory diseases gave one doubtful positive; (*c*) 11 syphilitics gave 1 positive; (*d*) 4 cases of hypertrophic cirrhosis and 2 cases of gastric cancer, gave no positives; (*e*) two cases of sleeping sickness and a guineapig infected with trypanosomiasis, gave no positive reactions. (See TRENSZ above, and 1932, Vol. 29, p. 715.) *W. F.*

FARJOT. Résultats de cent séro-floculations de Henry. [**Henry's Seroflocculation.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 428–432.

In cases of syphilis with a strongly positive Wassermann reaction, the reaction of Henry may also be positive, apart from malarial infection.

Four malaria patients, with parasites in the blood were examined 11 times. They were all positive. One became negative after treatment with quinine. Twenty-one persons without parasites, but who had had malaria within six years, gave 13 positives and 8 negatives. Seven persons who had had malaria more than six years before gave 1 positive and 6 negatives. Thirty-three persons who had never had malaria were examined as controls; of these, 29 were negative and 4 were positive. Three of the 4 positives were syphilitics, the other was suffering from tuberculosis and gave a strong flocculation with resorcin. These results led the author to apply Henry's test to a small group of syphilitics. Four with a very feeble Wassermann reaction gave negative Henry tests, and 3 with a strongly positive Wassermann reaction gave a positive Henry's reaction, though they had never had malaria. *W. F.*

ASCIONE (Guglielmo) & MARIOTTI (Ettore). Sul passaggio dei parassiti malarici nel liquido cerebro-spinale e loro comportamento verso le candele porose. (**On the Passage of Malarial Parasites in the Cerebro-Spinal Fluid, and their Behaviour towards the Diatomaceous Earth Filters.**)—*Riv. di Malariologia.* 1932. July–Aug. Vol. 11. No. 4. pp. 417–425. With 14 charts on 5 plates. English summary p. 549.

" The cerebro-spinal fluid (5 experiments) and blood (5 experiments) taken from tertian patients during the fever attacks, were passed through the Berkefeld V and N filters. The intravenous or intrarrhachidian inoculation of the filtrate in psychopathic patients, reproduced the fever attacks after a period of incubation which generally lasted from 10 to 12 days. The accesses were mild, and sometimes irregular, and some relapses were observed. During the first fever accesses malarial parasites were not found in the peripheral blood and in the spleens of these patients, but they appeared during the successive attacks, except in 4 cases. The blood of two of these cases was capable of producing fever symptoms in other mental patients, in whom parasites were also observed."

A number of temperature charts are reproduced. *A. G. B.*

MARCHOUX (E.), LEROY (R.) & CHORINE (V.). .Essais infructueux de filtration du paludisme. [**Unsuccessful Attempts to filter Malaria Parasites.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 260–266.

The infectivity of cerebrospinal fluid is due to the presence of infected red cells, and is removed by filtration.

ASCIONE and MARIOTTI reported that the cerebrospinal fluid, in malaria, contained invisible parasites which would pass through Berkefeld V and N. candles, and would convey infection when the filtrate was inoculated into susceptible subjects. They also reported that citrated plasma was infective after filtration. The authors found that the cerebrospinal fluid was infective during an attack of malaria. After centrifuging at high speed, malaria parasites were demonstrated at the bottom of the tube, and the supernatant fluid was no longer infective. Filtration through a Berkefeld N. candle removed the parasites and the fluid was no longer infective. Samples of cerebrospinal fluid always contain a few red cells originating from vessels wounded during the introduction of the canula, and the malaria parasites gain access to the fluid in this way. The red cells break up and disappear with centrifugation at high speed and cannot be demonstrated unless they are fixed beforehand by the addition of a few drops of osmic acid. This may be the explanation of the statement made by ASCIONE and MARIOTTI. *W. F.*

TAREEV (E. M.) & GONTAEWA (A. A.). Zur Bestimmung des Albumin-Globulin-Mischungsverhältnisses im Blutserum bei Malaria. [**Albumin-Globulin Ratio of the Blood Serum in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Jan. Vol. 37. No. 1. pp. 28–37. With 1 fig. [16 refs.]

The authors refer to the important research work of LLOYD & PAUL in Calcutta [see this *Bulletin*, Vol. 27, p. 561]. For the determination of the ratio the simpler method of Rusznyak was used. They examined 58 cases, 43 of natural malaria and 15 with inoculated malaria; the latter were cases of general paralysis and were the most interesting. In general paralysis there is an increase of the globulin fraction. They conclude that:—The albumin-globulin coefficient of the serum is lowered in most cases of malaria. In experimental malaria the albumin-globulin ratio falls with number of rigors and with the termination of the fever it returns to normal. The coefficient and the sedimentation rate of red cells vary inversely. The reduction in the serum albumin coefficient has no value for differential diagnosis of malaria as it occurs in other infections and intoxications.

E. D. W. Greig.

BENHAMOU (E.). Les réticulocytes dans le paludisme. [**Reticulocytes in Malaria.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 426–427.

The normal percentage of reticulocytes, as demonstrated by vital staining, is between 0·5 and 1·5. The number is increased in malaria in consequence of the response of the bone marrow to the destruction of blood corpuscles, and percentages of 3, 4 and 5 are frequently seen with red blood counts between 3,500,000 and 4,500,000. In one severe case with a count of only 1,300,000 red cells, there were 19 per cent. of reticulocytes. *W. F.*

MATHESON (Robert), BOYD (Mark F.) & STRATMAN-THOMAS (Warren K.). *Anopheles Walkeri,* **Theobald, as a Vector of** *Plasmodium vivax,* **Grassi and Feletti.**—*Amer. Jl. Hyg.* 1933. Mar. Vol. 17. No. 2. pp. 515–516.

Specimens of this mosquito caught at Ithaca, New York, were sent by air mail to the Station for Malaria Research at Tallahassee, Florida, where they were fed on a case of benign tertian malaria. They were then kept at a cool temperature, between 19° and 22·8°C. Four out of six became infected and the disease was conveyed to a patient by their bites. The incubation period in these mosquitoes is about 17 days. *W. F.*

CHORINE (V.). Essais de culture de *Plasmodium falciparum.* Action de l'acide carbonique. [**Carbonic Acid in Cultures of** *P. falciparum.*] —*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 953–955.

A reaction of pH 7·3 is the most suitable for blood cultures. This can be adjusted by passing carbon dioxide through the medium, or by adding hydrochloric acid. *P. falciparum* can be kept alive for five generations by subculturing every one or two days into defibrinated blood containing glucose and adjusted to this reaction. *W. F.*

BOUCHER (H.). Etude du sang des paludéens (à *Plasmodium vivax*) par les colorations vitales au rouge neutre et au bleu crésyl brillant. [**Vital Staining in Malaria.**]—*C. R. Soc. Biol.* 1933. Feb. 10. Vol. 112. No. 5. pp. 468–471. With 16 figs.

A saturated solution of neutral red, or of Grübler's brilliant cresyl blue, is made in absolute alcohol. This is then brought down to half saturation by adding an equal quantity of alcohol. A few drops of stain are poured on to a slide which is tilted in order to distribute it evenly over the surface, where it dries as a thin pellicle The drop of blood for examination is taken on to this stained slide, covered with a cover-slip, luted round the edges with paraffin and put in the incubator for 5 to 10 minutes The cresyl blue stains the parasites well *P vivax* contains granules stained by neutral red when the parasite is alive *W F*

GREEN (Richard) **A Rapid Method of Staining and Mounting Mid-Guts of Mosquitoes for the Demonstration of Oocysts.**—*Parasitology* 1932 Oct Vol 24 No 3 pp 305–306

The midgut is fixed by running 1 per cent formaldehyde in normal saline under the coverslip It is stained with Pugh's toluidine blue, dehydrated with acetone, and mounted in Canada balsam or euparal

W F

MORISHITA (Kaoru) **The Useful Points of Alkali-staining for the Examination of Malaria Parasites.**—*Taiwan Igakkai Zasshi* (*Jl Med Assoc Formosa*) 1932 Nov Vol 31 No 11 (332) [In Japanese With 1 plate English summary pp 110–111]

The author recommends the use of alkaline distilled water (alkali-dilution 0 003 per cent) to which Merck's Giemsa is added in the proportion of 1 drop to 1 cc The duration of staining should be 1 hour *W F*

BOYD (Mark F) & STRATMAN-THOMAS (Warren K) **A Controlled Technique for the Employment of Naturally Induced Malaria in the Therapy of Paresis.**—*Amer Jl Hyg* 1933 Jan Vol 17 No 1 pp 37–54

The simple method of inducing malaria by the inoculation of blood from a malaria patient has been criticized because of the possibility of transferring neurotropic strains of the syphilitic virus, or other infections, from which the donor may be suffering In view of this possibility, the British Ministry of Health has prohibited the use of malaria therapy under these conditions The authors here present an account of the technique employed by them in Florida in maintaining strains of *P vivax* in mosquitoes for therapeutic purposes They have found some strains much less virulent than others They do not accept statements to the effect that in some institutions there are strains of *P vivax* which, after repeated passage by blood inoculation, have lost their power to produce gametocytes (*ante*, p 87) Such assertions are probably made by those who are ' but slightly familiar with the morphology of the parasites " *W F*

SMITH (A W H) **Therapeutic Malarialization of General Paralytics in the Tropics.**—*Jl Mental Sci* 1933 Jan Vol 79 No 324 pp 94–101 [17 refs]

Malaria exists throughout the whole of the Malay Peninsula, but, in spite of this, general paralysis of the insane is as common as in Europe Therapeutic malaria is comparatively useless At the Central Mental Hospital (2,500 inmates) 56 patients were inoculated with the result that only 3 were discharged Forty-two failed to contract malaria, although they were re-inoculated several times, and may be presumed to have some degree of immunity *W F*

CIUCA (M.), BALLIF (L.) & VIERU (M. Chelarescu). Contribution à l'étude de l'infection paludéenne, intentionnellement provoquée par inoculation de sang virulent de tierce bénigne, de fièvre quarte et de Laverania. [**Inoculation Malaria with the Three Species of Malaria Parasites.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 300–305.

A large proportion of the population of Rumania is immune, especially to *P. vivax*. Strains of *P. malariae* and *P. falciparum* are therefore employed, in addition, for therapeutic inoculation. About 30 per cent. are immune to *P. vivax* and 20 per cent. to *P. falciparum*. The authors found, by the inoculation of susceptible persons with the blood of immune patients, that the immunity was often due to a latent infection—a *premunition*, such as SERGENT has described in the malaria of birds. *W. F.*

LEISERMANN (L. I.). Die experimentelle Malaria beim Menschen. [**Human Experimental Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Dec. Vol. 36. No. 12. pp. 650–671. With 15 figs. [43 refs.]

The author's observations commenced in 1924 and his material was obtained from 253 patients (226 men and 27 women) treated with malaria for various diseases. His strains were obtained from 14 cases of spontaneous malaria (13 cases *P. vivax* and 1 *P. vivax* and *P. falciparum*) and from 2 cases of general paralysis inoculated with *P. vivax*. The blood was inoculated in various ways, chiefly subcutaneously and intravenously. He discusses the subject under the following headings:—incubation period; attack; under the latter he deals with, blood changes, parasitological picture, course of fever, special parasitological picture, mortality in experimental malaria, termination of experimental malaria, immunity in experimental malaria. He had only 4 deaths and only one of these could be certainly ascribed to the malaria treatment, giving a mortality of 0·39 per cent. He finds the immunity produced by inoculated malaria is not lasting and its grade varies with the strain employed. The paper should be read by those interested in malariotherapy. *E. D. W. Greig.*

WEISS (O. L.). Die Impfmalaria und ihre Kupierung durch Cardiazol-Chinin. [**Termination of Inoculation Malaria by Cardiazol-Quinine.**]—*Med. Klin.* 1932. Dec. 9. Vol. 28. No. 50 (1461). With 2 figs.

The use of cardiazol during the whole period of the course of malaria is recommended in place of digitalis to support the heart. Recently Knoll & Co. have prepared a combination of cardiazol and quinine, which is dispensed in ampoules (each ampoule contains:—0·1 gm. cardiazol and 0·25 gm. quinine lactate) and in sugar coated beans (each bean contains:—0·05 cardiazol and 0·1 gm. quinine hydrochloride). His observations were made on 52 cases of inoculated malaria. Two beans of cardiazol-quinine were given 5 times daily for 5 days and the results in terminating the fever were better than those with quinine alone. In other cases he gave 4 ampoules daily for 5 days with even better results due, in his opinion, to the combination of quinine lactate and cardiazol having a more intensive action. Where there is anxiety regarding the general condition of the patient and it is desired to have only a moderate rise of temperature, then administration of 2 to 3 beans of cardiazol-quinine (0·1 to 0·15 gm. cardiazol and 0·2 to 0·3 gm. quinine) a few hours before the attack is expected is indicated; by this method a patient suffering from advanced aortic aneurysm was able to complete the course satisfactorily.

E. D. W. Greig.

SERGENT (Et.) & CATANEI (A.). Essais de filtration du virus du paludisme des oiseaux (*Plasmodium relictum*). [**Attempts to filter the Virus of Bird-Malaria.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 267–268.

The experiments here described were made in connexion with the claim of ASCIONE and MARIOTTI that *P. vivax* is filterable [see above, p. 487]. The authors found that when the citrated blood of canaries containing numerous *P. relictum* was passed through Chamberland L 1, L 2, and L 3 candles, the infection was removed. *W. F.*

RUSSELL (Paul F.) & NONO (Andres M.). **Avian Malaria, VII. Plasmochin as a Prophylactic Drug in Sporozoite Infections of Avian Malaria.**—*Philippine Jl. Sci.* 1932. Dec. Vol. 49. No. 4. pp. 595–625. With 1 plate. [20 refs.]

The authors found that plasmoquine did not protect against sporozoite infection in avian malaria, whether the sporozoites were inoculated by mosquitoes or with a syringe. They conclude from their own experience, and that of others, that plasmoquine has no better claim than quinine to the title of prophylactic in human malaria.

Russell (this *Bulletin*, Vol. 29, p. 353) has already shown that, *in the inoculation of blood* containing *P. cathemerium* of canaries, infection of the recipients is regularly prevented by daily intramuscular injections of 0·00016 grams of plasmoquine. In this paper, its effect on sporozoite infections is investigated. Two birds were put into cages with infected *C. quinquefasciatus* (*fatigans*) for 5 days, and 0·0002 grams of plasmoquine were injected daily. Both birds became infected and died. Three birds put for one day into a cage containing mosquitoes infected with *P. capistrani*, became infected although they were given inoculations of plasmoquine both before and after exposure. The results were no better when quinoplasmine was used. Other birds were kept in the infecting cage for only a few hours, and were given plasmoquine injections, up to the maximum tolerated dose, before, in the middle, and at the end of the exposure, but they were not protected. A number of birds were inoculated with sporozoites by means of a syringe. Plasmoquine was given both before and after the inoculation, but there was no evidence of protection. The sporozoite emulsion was made by grinding up the thoraces of infected mosquitoes in salt solution. In another experiment, plasmoquine was added to the sporozoite-saline emulsion, and the mixture was left for 15 minutes before being injected into canaries. There was no evidence of protection, 3 out of 4 birds became infected. The authors conclude that neither plasmoquine, nor quinoplasmine, in the maximum doses which will not cause toxic symptoms, is a prophylactic against avian malaria when sporozoites are injected, either in saliva by mosquitoes or in saline mixtures by needle. *W. F.*

TATE (P.) & VINCENT (M.). **The Action of Plasmoquine on Mosquito-induced Malaria of Birds.**—*Parasitology.* 1933. Feb. Vol. 25. No. 1. pp. 96–101. [11 refs.]

Plasmoquine prevents or delays attacks of malaria in birds infected with *P. relictum* by direct blood inoculation, but has little or no prophylactic action in birds infected by the bites of mosquitoes.

Plasmoquine given in large doses to canaries before they were bitten, or for three days before and one after, had no prophylactic action in 3 out of 4 birds treated. Plasmoquine given daily for 6 days after mosquito infections, had no effect on the time of appearance of parasites. Though longer treatment prevented the appearance of parasites while it was continued, they appeared soon after it was stopped. On the contrary, very small doses of plasmoquine caused great delay in the appearance of parasites when the infection was by blood inoculation.

W. F.

RUSSELL (Paul F.). **Avian Malaria Studies, VIII. The Bleeding Time in Canaries : Normal and in Malaria.**—*Philippine Jl. Sci.* 1932. Dec. Vol. 49. No. 4. pp. 627–649. With 5 plates & 1 fig. [12 refs.]

The bleeding-time is often doubled in acute avian malaria.

Duke's bleeding-time test consists of blotting up on absorbent paper, at half-minute intervals, the blood which has flowed from a small cut in the ear. The duration of the haemorrhage is called the bleeding time. It is distinct from the coagulation time, and is not prolonged in haemophilia. The average bleeding-time in man is 2·5 minutes. The author examined canaries by pricking their legs with a Hagedorn needle. The average bleeding-time was only 42·4 seconds. In acute avian malaria, the B.T. was more than doubled in 52 per cent. of the birds. This prolonged B.T. coincides with, but is not necessarily caused by, a decrease in the red cells and the calcium content of the blood. *W. F.*

i. SINTON (J. A.) & MULLIGAN (H. W.). **Note on an Intradermal Reaction in Monkey Malaria.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 581–583.

ii. —— & ——. **Studies in Immunity in Malaria. Part I. An Intradermal Reaction in Malarial Infections in Monkeys.**—*Records of the Malaria Survey of India.* 1932. Dec. Vol. 3. No. 2. pp. 323–345. With 4 plates. [14 refs.]

i. Infected monkeys gave a positive skin reaction when inoculated intradermally with an antigen prepared by digesting a suspension of malaria parasites with papain.

For the first few hours after injection, there was more swelling in the normal controls than in the infected monkeys but, after 3 or 4 hours, reaction commenced in the latter and within 24 hours there was a definite swelling 20 mm. in diameter, with central necrosis or petechiae ; meanwhile all swelling had disappeared in the controls. The more acute and severe the infection, the greater was the reaction.

ii. This is a more detailed account and good illustrations are given.

W. F.

ROW (R.), DALAL (N. P.) & GOLLERKERI (G. V.). **On the Value of Atebrin in Monkey Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Mar. 23. Vol. 26. No. 5. pp. 469–470. [10 refs.]

Atebrin did not cure malaria in two monkeys under experiment.

Infection in *Macacus rhesus* is almost always fatal. Two of them were inoculated with blood from an infected moribund monkey. On the day after parasites first appeared, they were each given 0·025 gm. of atebrin, and this treatment was continued for 4 more days. The parasites disappeared, but reappeared 12 days later. One was then given atebrin for 15 days, and the other for 5 days. Again the parasites disappeared, but in about 14 days they returned and the animals died. *W. F.*

WATSON (Malcolm). **Tropical Hygiene and Malaria Control on Mines at Various Elevations.**—*Bull. Inst. Mining & Metallurgy.* 1933. Jan. No. 340. 12 pp. With 6 figs. on 4 plates.

Alluvial mines and rice fields are usually free from malaria because the water is contaminated with silt. An example of malaria control on an Indian iron mine is given. On the Rhodesian copper mines, pools must be oiled and sites chosen far from swamps ; otherwise these must be drained.

The author gives a brief outline of the biology of the malaria parasite, and touches on the breeding places of mosquitoes. The old idea that for malaria to occur there must be a swamp and stagnant water is far from the truth. The most extensive swamps in which people live are rice fields, but thousands of square miles of them in India, Malaya, Siam, the Philippines and Java are almost entirely free from malaria, so too are the silty swamps round tin mines. The reason is that most malaria-carrying mosquitoes choose clean water, and will not breed in the contaminated water of mines and rice fields. The tin mines of Malaya lie between sea level and 1,000 feet. They are usually free from malaria because the water in the surrounding swamps is contaminated by the tailings from the mines. Some which have small streams running near them are very malarious, but the disease can be controlled by oiling. The iron mines in India, at an elevation of 500 to 2,000 feet are intensely malarious in the monsoon, when there are many springs. Work at the Noamundi mine was almost brought to a standstill by malaria which originated in a stream running down the centre of the area. When this and its branches had been controlled, the mine became healthy. The copper mines of Northern Rhodesia lie at an elevation of 4,000 feet ; the carriers are :—(1) *A. costalis* which lives in pools in the sunshine, and can be dealt with by regular oiling, and (2) *A. funestus* which breeds in the grass-grown swamps, known as dambos, where drainage is necessary to control them. The camps should be pitched as far as possible from extensive dambos. *W. F.*

BARROWMAN (Barclay). **An Example of Antimalarial Subsoil Drainage under Rural Conditions.**—*Malayan Med. Jl.* 1932. Dec. Vol. 7. No. 4. pp. 116–118. With 1 fig.

Several speakers at the annual meeting of the Malayan Branch of the B.M.A. (this *Bulletin*, Vol. 29, p. 335) expressed doubt as to the suitability of subsoil drainage for rubber estates. The author gives an outstanding example of its success in such an area.

Seafield, the estate in question, " is situated within a belt of territory which is probably amongst the most malarious spots in the world." During the first fourteen years following the installation of subsoil drains :—" The malaria incidence was reduced from 939 per cent. per annum to 1 per cent. per annum. . . . This record alone gives ample evidence of how effective was the work of malaria control, which depends for its success on drainage alone. . . . The total contribution of the Company to anti-malaria schemes from 1910 to 1932 on the estate, amounts to nearly a quarter of a million dollars or £30,000." It is calculated that the alternative scheme of open drains and oiling would have cost some £700 a year more than the subsoil drains.

W. F.

BARROWMAN (B.). **A Note from an Estate Medical Practice in Malaya.** —*Indian Med. Gaz.* 1933. Feb. Vol. 68. No. 2. pp. 92–102. With 1 map, 13 charts & 1 fig.

The author has been associated for the last eleven years, first as an assistant and later as principal, with the practice founded in 1908 by Sir Malcolm WATSON whose methods of malaria control he follows with but little alteration. *A. ludlowi*, the brackish water breeder of the coastal belt, is dealt with by bunding and the provision of drainage through tide-gates. *A. umbrosus*, of the flat land, is controlled by concentrating all water in clean-cut channels, free from vegetation and open to the sunlight. *A. maculatus* of the hilly country is also dealt with by concentrating all water in well-defined channels ; either subsoil, open concrete, or earth drains. The latter require oiling. It is mentioned, as a warning, that on one estate where the subsoil pipes became blocked and water seeped to the surface, oiling was used with disastrous effect ; for when the pipes were cleared, the oily earth above them formed an impervious covering which had to be removed before drainage could be effected. Another important point is that subsoil drains cannot carry off storm water. The ravines must therefore be levelled and graded in order to allow the surface water free passage to the open drains. As an example of the success of antimalaria drainage, in an area cut off by water from contaminating influences, the author tells the story of Carey Island, which is situated at the mouth of the same river as the notorious Port Swettenham. Malaria control on Carey Island was begun when it was cleared for rubber planting ; it consists of deep drainage, careful supervising of tide-gates and the siting of all housing at least half a mile from uncontrolled areas. The potential vectors are *A. ludlowi* and *A. umbrosus*. No oiling has ever been done. The population is about 5,000 ; 17,000 acres are under cultivation. The malaria incidence over the last 12 years has been less than 1 per cent. per annum. *W. F.*

WHITE (R. Senior). **Notes on a Brief Tour in Malaya.**—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 683–690. With 15 figs. and 1 diagram.

The author deals with the impracticability of the general application of Malayan methods to India, with the more recent developments of subsoil drainage, and with the biological control of *A. maculatus*.

The first thing which struck him was that conditions in Malaya were quite different from those in India. He saw few Malays ; it was not a problem of scattered villages, but a problem of industrial and urban malaria ; to subject Malayan methods to criticism based on an Indian viewpoint seemed futile. He was also struck by the sharp limitation of each of the three carriers to its own particular zone ; *A. ludlowi* to the tidal, mangrove flats, *A. umbrosus* to the jungle of the lowlands, *A. maculatus* to the hills. He found that subsoil drainage had undergone several modifications since the early days ; the pipes are now laid 5 feet deep instead of 18 inches. The herring-bone layout has given place to a central pipe with hill-foot laterals leading into it at intervals. The surface water is no longer carried underground by the central subsoil drain, but is taken off by an open drain laid above it. The expense is heavy ; the pipes get blocked with roots, and must be taken up and cleaned ; the grass in the ravines must be cut [this cannot be cropped by cattle, as the author suggests, because *A. maculatus* will breed in the hoof-marks] ; trees must not be grown near the drains, and this may involve the sacrifice of 4 or 5 per cent. of the rubber trees on an estate. In all, the annual upkeep charges amount to 5 per cent. on the capital outlay. The author was particularly interested in the " biological control " of *A. maculatus*, by Professor WILLIAMSON, in the sanatorium area known as Cameron's Highlands. Here, by means of a set of tree-trunk dams, a *maculatus* breeding stream was converted into a series of pools with minature waterfalls. Manure and leaf mould were put into these pools, water plants (*Nymphaeaceae* and *Utricularia*) were introduced, and now *A. maculatus* no longer breeds there, but only *A. sinensis* and *A. barbirostris*. *W. F.*

CRAWFORD (R.). **Economy and Antimalarial Oiling.**—*Malayan Med. Jl.* 1932. Dec. Vol. 7. No. 4. pp. 112–115. With 2 figs.

It is suggested that the lower portions of streams, where the flow is slower and where oil coming down from the upper reaches tends to accumulate, do not need oiling so often as the more swiftly running streamlets near the source. For example, every 7 days at the head of the stream, and every 10 days lower down may be sufficient. Experiments are described which show that the substances passing into solution from the oil are of little importance, and that larvicidal action depends on the presence of a film. Exposure to an oil film for one hour caused the death of practically all larvae. Some 25 to 50 per cent. of anti-malarial oil can be recovered, for using again, if a boom is erected at a suitable site completely interrupting the water surface, and projecting some distance above and below it. *W. F.*

IREDELL (A. W.). **An Account of Mosquito-Proofing carried out by the Royal Air Force in India.**—*Proc. Roy. Soc. Med.* 1932. Nov. Vol. 26. No. 1. pp. 1–5 (United Services Sect. pp. 1–5). Also in *Jl. Roy. Army Med. Corps.* 1933. Jan. Vol. 60. No. 1. pp. 33–37.

The author demonstrates the reduction in malaria which followed mosquito-proofing of R.A.F. stations in India.

Col. HANAFIN, I.M.S., reported in 1928 on the mosquito-proofing of one of two sets of barracks at Lahore. The incidence of malaria per 1,000 for the years in which the barracks were unproofed was 850, 483, and 568 ; for two years after proofing, it was 182 and 46. The incidence in the control, unproofed barracks nearby was, 594, 307, 470, 672, and 266. The author's observations concern the mosquito-proofing of the R.A.F. stations at Karachi and Kohat. In the following table the figures in dark type show the incidence per thousand after the buildings had been proofed with gauze consisting of 90 parts of copper and 10 of zinc. Antimosquito measures were impracticable, since a prolific breeding area, close to the station, was on private land and could not be touched.

TABLE A.—Malaria (Primary) at R.A.F. Stations, India.

Station.	Average strength.	Case Incidence per 1,000.						
		1925	1926	1927	1928	1929	1930	1931
Karachi	729	99	142	183	44	82	20	10
Kohat	188	149	378	183	150	280	167	57
Ambala	146	119	124	104	37	30	26	91
Lahore	146	118	261	187	21	150	90	87
Peshawar ...	164	85	214	126	39	180	50	6
Quetta	231	17	233	40	46	85	46	125
Risalpur ...	247	61	139	85	15	189	57	39

The sea-breezes filled the meshes of the gauze with sand. Gentle hosing cleaned it more satisfactorily than scrubbing with hard brushes. The lower 5 feet of the gauze was protected with ordinary 1 inch wire netting. The men were most emphatically and unanimously in favour of mosquito-proofing as opposed to mosquito-nets. The cost, at Karachi, was £8,300, and at Kohat, £3,700. Money was not available for proofing other stations. *W. F.*

EARLE (Walter C.). **Some Observations of Antimosquito Screening and Screening Materials.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1932. Dec. Vol. 8. No. 2. pp. 227–234. [Spanish version pp. 235–242.]

The author directed a current of air from an electric fan on an anemometer, and on wet- and dry-bulb thermometers. He then placed samples of wire gauze between the fan and the instruments, and noted the amount of obstruction.

Data on Obstruction to Wind Caused by Various Types of Screens—Using Electric Fan as Source of Wind.

		Without Screen	1 16 Mesh copper ·01 in. wire	2 16 Mesh copper ·015 in. wire	3 16 Mesh bronze ·015 in. wire	4 16 Mesh bronze ·01 in. wire	5 16 Mesh copper ·01 in. wire	6 16 Mesh Monel metal ·009 in. wire	7 12 Mesh galv. wire	8 Cotton cloth screen 16 mesh
I. With Anemometer	Screen at right angle to direction of wind ...	10	6	5	5·5	6	6·5	7·0	8·5	2·5
	Screen at 45° angle ...			6·5	6·5	6	6·5	7·0	8·5	6·5
II. With Thermometer	Screen at right angle to direction of wind ...	35	35	52	48	35	35	38	40	60
	Screen at 45° angle ...		35	43						40

I. Numbers represent velocity of wind in miles per hour.
II. Numbers represent time in seconds necessary to reduce temperature of wet bulb to minimum.
Dry temperature at beginning 85. Wet=78·5.
Dry temperature at end of experiments 87·5. Wet=78·8.

The objection is frequently raised that screening interferes with ventilation and makes a house hotter. The table shows that metal screens of coarse mesh reduce the velocity only about one-third, and that there is no appreciable difference in the rate of lowering the wet-bulb thermometer. Cloth screens gave very bad results.

A great advantage of screening is that it makes the stuffy mosquito-net unnecessary. Galvanized iron screening, 12 mesh, 0·015 wire is satisfactory for use several miles inland, but it lasts only a few months where it is exposed to sea-breezes. Near the sea, the more expensive bronze, or Monel metal, wire must be used. *W. F.*

ACHUNDOW (I.). Ueber den heutigen Stand der Malariabekämpfungsfrage in Aserbaidjan. [**Present Position of Antimalarial Measures in Azerbaijan.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Mar. Vol. 37. No. 3. pp. 136–141.

The author gives an account of malaria, principles of antimalarial measures, organization and results of antimalarial campaign, and further plans and schemes for antimalarial operations, in the Republic of Azerbaijan (in the eastern part of the Transcaucasus).

Malaria plays a very important rôle in the diseases of the country; thus in recent years the spleen index varied from 25·7–52·4 per cent.; the parasitic index from 6·5–22·4 per cent.; and the Ross index from 1·5–3·4 per cent. The principle of the antimalarial measures is a combination of the Koch and Ross methods carried out simultaneously. The antimalarial organization consists of:—(*a*) A central Transcaucasian malarial committee. (*b*) A malarial committee for the Republic. (*c*) A tropical institute at Baku. (*d*) At the periphery, malarial tropical stations, posts and sections. On antimalarial measures in Azerbaijan the following amounts were expended, in 1930, 435,000 roubles, in 1931, 1,327,300, in 1932, from 3,353,000–5,281,700. The further plans for antimalarial operations include quinine prophylaxis, small bonification schemes and later the carrying out of large drainage schemes in swampy areas. *E. D. W. Greig.*

FIGUEIRA (L.) & LANDEIRO (F.). Estação experimental de Benavente: relatório do primeiro ano de luta antisezonática (1931). [**Antimalaria Measures at Benavente (Portugal) in 1931.**]—*Arquivos Inst. Bact. Camara Pestana.* 1932. Vol. 6. No. 3. pp. 191–243. With 22 figs. & 1 plate. French summary.

BÔTO (Rodrigo). Addenda. Resultado das observações efectuadas nos concelhos de Benavente e Salvaterra de Magos sôbre a distribuição da "Gambúsia" e a sua provável procedência.—*Ibid.* pp. 245–249. With 1 map.

Benavente has an area of 2,880 hectares [nearly 7,200 acres] of which 100 are occupied by surface water and 95 by rice fields. This article gives a detailed account of the prevalence of malaria, the investigations carried out at the experimental station during the first year of its inauguration and the measures taken to deal with the conditions found.

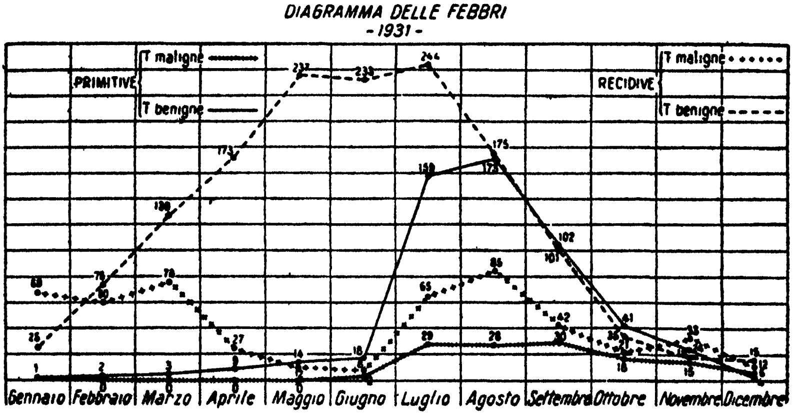
The prevalence of infection varied greatly according to the time of year. Among 208 school children examined in April the percentage of infection was 30·7; in November among the same number only 3·9; the splenic indexes at the same times were 23·5 and 3·1 per cent. respectively. Among 2,930 presenting themselves for consultation more than half (58·8 per cent.) showed parasites; 48·9 per cent. were *P. vivax,* only 5·2 *P. falciparum* (excluding 1·2 per cent. in whom both were present), and 0·7 *P. malariae*; 3·8 per cent. were not identified.

The water-collections were treated with Paris green, distributed by aeroplane. Gambusia was extensively employed also. Of 71,663 mosquitoes captured the proportion of Anopheles to Culex was 26 : 1. 2,089 individuals received treatment.

The article is well illustrated by photographs showing the conditions of the terrain before and after treatment. *H. H. S.*

PECORI (G.) & ESCALAR (G.). Relazione sulla campagna antimalarica nell'Agro Romano durante l'anno 1931. **[The Antimalaria Campaign in Agro Romano during 1931.]**—*Riv. di Malariologia.* 1932. Vol. 11. No. 5. 63 pp. With 15 figs. (1 map).

The report opens with an account of the organization and enumerates the various health depots—8 suburban, 28 permanent stations in Agro Romano and 2 of a temporary nature. A map is reproduced showing by depth of shading the prevalence of infection in the various districts. The population is given as 79,708 of whom 31,392 are floating (nomadi) and 43,316 permanent. The numbers infected or suffering from attacks during the year are stated: of 641 cases of subtertian malaria 129 were first attacks and 512 relapses; of 2,021 benign tertian 550 were first attacks and 1,471 relapses; there were 23 quartan, 4 being first attacks. In all three the figures were lower than in 1930, namely 253 less subtertian, 470 benign tertian and 7 quartan, the grand total being 2,685 in place of 3,415 and the percentage infection 3·2, the lowest in the table of records giving the returns since 1924.



Showing monthly prevalence of benign and malignant tertian infections in Agro Romano during 1931, distinguishing first attacks (primitive) from relapses (recidive).

[Reproduced from the *Rivista di Malariologia.*]

Next follow details of infection among the permanent and nomadic population and a diagram showing very graphically the monthly prevalence of the benign and malignant tertian infections.

Of 5,627 children in the rural school 383 had enlarged spleens, 6·8 per cent. as compared with 7·6 in 1930.

The last section of the report deals with antimalaria measures such as the treatment of patients, antilarval campaigns, bonification on a small scale and zooprophylaxis. There are appended many tables with details of population and infection rate of the various localities in the larger districts. *H. H. S.*

FISCHER (O.) & GÜNSBERGER (O. D.). Ueber die Ursache der positiven Wassermann-Reaktion bei Malaria. [**The Cause of the Positive Wassermann Reaction in Malaria.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 3/4. pp. 295–307. [20 refs.]

The authors detail the results of their experimental research to prove their proposition that the positive W.R. given by serum from malarial cases is caused by the reaction of erythrocyte lipoids with homologous antibodies.

They found 21 sera out of 28 from malarial cases gave definite to complete positive complement fixation with erythrocyte extract; five hundred Wassermann negative sera from healthy and sick persons gave, with few exceptions, negative reactions. Of 60 Wassermann positive sera some reacted also with the erythrocyte antigen, but they could be easily distinguished from the malarial sera if the quantitative behaviour was taken into consideration. An ox heart extract relatively poor in erythrocyte lipoids is described, and although a good syphilitic antigen, with malarial sera it either did not react or only relatively weakly. If the W.R. is carried out with erythrocyte extract also, then the Wassermann positive reactions in malaria can be certainly differentiated from those of syphilis, which is of considerable practical importance in malarial districts. *E. D. W. Greig.*

PESOPOULOS (Spiro). Ueber eine gastralgische Form von Malaria mit Mundaphthen. [**A Form of Malaria with Gastralgia and Aphthae of the Mouth.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Feb. Vol. 37. No. 2. pp. 69–72. [11 refs.]

The case of a young man who for more than 3 years had suffered regularly every 40 days with fever lasting 8–12 days accompanied by gastralgia and aphthae; cure was effected by an intensive course of quinine. Malarial parasites were not found. *A. G. B.*

GIGLIOLI (George). **Quartan Malarial Nephritis and Malarial Haemoglobinuria as Family or House Diseases in the Interior of British Guiana. Field Observations on the Epidemiology and Etiology of Blackwater Fever.**—Davson Centenary Fund—British Guiana Gold Medal Award, 1932.—32 pp. With 2 charts. [15 refs.]

The conclusions reached by the author as the result of these investigations have already appeared in this *Bulletin* under the heading of Blackwater Fever, see page 97, above. *W. F.*

MONTGOMERY (W M) **Sulphur as a Prophylactic in Malaria.**—*South African Med Jl* 1932 Dec 10 Vol 6 No 23 pp 771–772

The daily ingestion of sulphur in quantity "sufficient to give a pronounced odour to the sweat" acts as a prophylactic *W F*

SMITH (Claude R) **The Specificity of the Kahn Test in Malaria.**—*Jl Lab. & Clin Med* 1933 Jan Vol 18 No 4 pp 396–398

The author concludes that malaria infection has no effect upon the results of the Kahn test *W F*

AUBRY & DUMOLARD Comment il faut concevoir le paludisme chronique au point de vue clinique—*Arch Inst Pasteur d Algérie*—1932 Sept Vol 10 No 3 pp 342–344.

BARRAUD (P J) *Anopheles aitkeni* James var n *pinjaurensis*—*Records of the Malaria Survey of India* 1932 Dec Vol 3 No 2 pp 353–355 With 6 figs

BENHAMOU (E) & NOUCHY (A) A propos de trois cas d ictère hémolytique paludéen—*Bull Soc Path Exot* 1933 Mar 8 Vol 26 No 3 pp 423–425

BENHAMOU (E) & ODRY Purpura palustre—*Bull Soc Path Exot* 1933 Mar 8 Vol 26 No 3 pp 420–422

BONFA (A) The Life-Cycle of Malaria Parasites in Human Blood—*South African Med Jl* 1932 Dec 24 Vol 6 No 24 pp 796–801

BOOKER (C G) & ANNECKE (S) The General Practitioner in the Prevention of Malaria—*South African Med Jl* 1933 Feb 11 Vol 7 No 3 pp 79–84

BROTZU (Giuseppe) La profilassi medicamentosa della malaria nel campo pratico—Reprinted from *Bull d Sci Med* 1932 7 pp

BROTZU (Giuseppe) Bonifica umana in due zone malariche del Ravennate—Reprinted from *Bull d Sci Med* 1932 7 pp

COVELL (G) A Further Note on Malaria in Patiala State—*Records of the Malaria Survey of India* 1932 Dec Vol 3 No 2 pp 271–278 With 1 map

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We record with much regret the death on June 7th of Sir WALTER MORLEY FLETCHER. Sir Walter was the representative of the Medical Research Council on the Managing Committee of the Bureau from September 1924.

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TROPICAL DISEASES BULLETIN.

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DIAGNOSIS OF HELMINTHIC INFECTIONS: A TWELVE YEAR SURVEY.

By Lieut.-Colonel CLAYTON LANE, M.D., I.M.S. (retd.).
Sectional Editor, Tropical Diseases Bulletin.

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Within the past twelve years about 300 papers on the diagnosis of helminthic infections have been abstracted in this *Bulletin*. What follows is an attempt to suggest the position to which this great amount of work has brought us. The writer's own division of the subject (1928, **25**, 937)* is adopted, namely into direct, sub-direct and indirect diagnosis. Direct diagnosis is that in which the parasite itself is observed as it lies in or leaves the host, subdirect that in which an

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*References are to summaries in this *Bulletin*, the first figure giving the year, the second, in black-face type, the volume number, and the third the page of the *Bulletin* containing the summary in question. Where the year of publication of the original paper differs from the year of publication of the *Bulletin* summary, two dates are given—the first in brackets referring to the original paper, and the second to the *Bulletin* summary.

immature stage which leaves the host is allowed to grow into a less immature one, indirect that in which host reactions to the parasites are observed or provoked, and recorded.

I. Direct Diagnosis.

Certainty in direct diagnosis depends on the obtaining of parasite-containing material and the examination of a sufficient quantity of it in an uncamouflaged state to insure detection of the parasites.

i. FAECAL EXAMINATION.

1. *Spurious parasitism.*

The usual assumption that parasites found in the faeces have lived in or been born in the alimentary canal of the individual in question is not necessarily correct. They may have been swallowed in mucus from the air passages, as is well realized, or they may have formed part of his food. KOFOID and WHITE (1919, **17**, 87) had reported the finding, in 429 of about 140,000 American soldiers examined in Texas, Oklahoma, New Mexico and Arizona, of eggs which they named *Oxyuris incognita.* BURNELL ((1921) 1922, **19**, 668) reported these eggs from Australia and Papua, and BACIGALUPO (1931, **28**, 210) from Buenos Aires. SANDGROUND, however ((1923) 1924, **21**, 574), showed that in fact they were those of *Heterodera radicicola*, a free-living nematode which is a common root parasite of radishes, celery, turnips and potatoes, and confirmed the point by finding them in human faeces after ingestion of parasitized roots. FAUST ((1924) 1925, **22**, 273) reminded readers how common such addenda may be ; but it is in the case of trematode eggs that this fallacy has been most widely reported. Examples are those of *Fasciola hepatica* and *Dicrocoelium dendriticum* (STROM (1927), 1928, **25**, 456 ; KOULAGUINE, 1929, **26**, 973), and of fish trematodes (MAEDA (1928), 1930, **27**, 453 ; TUBANGUI & FRANCISCO ((1930) 1931, **28**, 199). Perhaps the finding of *Hepaticola hepatica* eggs in faeces (SKRJABIN *et al.* (1929) 1931, **28**, 208) comes in this category, as does certainly the case of a boy reported by BLACKIE from South Africa (1932, **29**, 401) who had fed on field rats. BLACKIE also reports that his examinations covered the case of a man who showed in the faeces the eggs of *Schistosoma mattheei* after, and only after, he had enjoyed a satisfying length of half-raw ox gut.

2. *True parasitism.*

As regards true intestinal parasites, the main work has been done on hookworms, and what follows applies to them unless otherwise indicated.

The microscope, used for the detection of hookworm eggs, and the examination of the stools after a vermifuge, have been set in antagonism. DARLING, BARBER & HACKER ((1920) 1921, **18**, 117) found a difference in favour of worm recovery, by straining after treatment, of 4·6 per cent., and state that where an infection percentage of 80 was obtained by examination for ova there was little doubt that one of 90 or more would have been obtained by treatment. HACKETT ((1920) 1922, **19**, 242) put the margin in favour of worm counts as being 15 per cent. ; PAYNE, CORT & RILEY ((1923) 1924, **21**, 220) concurred in the superiority of worm counts but pointed out their expense and tediousness ; DARLING & SMILLIE ((1921) 1922, **19**, 247) reported 50 persons negative to microscopic examination of the stools "as carried out in the routine post laboratory," 23 of whom passed worms after a vermifuge, and pointed out that in those harbouring 5 to 20 worms it was chance which determined the finding of eggs. In connexion with this SMILLIE, however ((1922) 1923, **20,** 951), held the microscope reprieved since it displayed 94 per cent. of all persons harbouring more than 10 worms. Indeed it was more than reprieved by him, it was commended; for "the microscope may or may not give a positive diagnosis for a case harbouring 10 hookworms or fewer, but even if it fails it is doing a favour to the individual, for 3 or 4 or even 10 hookworms do not cause anyone sufficient injury to warrant the inconvenience and discomfort of two full treatments for hookworm disease." Whether light infections do in fact harm the host, or whether the medical man must in the interest of his patient attempt a diagnosis of the worm-load his patient carries, is considered below, but clearly the conclusions of DARLING & SMILLIE just quoted can be of general application, only if all microscopic techniques are of equal value, or if the one they used, which is nowhere stated, was the best of its kind.

All diagnostic techniques are emphatically not of the same value. Of them the simplest is the faecal smear, but nearly 30 years ago it was realized that examination of such a preparation might have to extend over many square inches before the first hookworm egg was found. A timely reminder of this lies in the report of KOBAYASHI *et al.* ((1929) 1930, **27,** 439); they examined 185 men by faecal smear on 6 occasions; for hookworms the first smear disclosed 83 infections, all six 129. Again, SCHWETZ & BAUMANN ((1929) 1931, **28,** 173) and ROSS ((1929) 1930, **27,** 438) note that the infection figures obtained by examination of a smear are pure chance. HAUSHEER and HERRICK ((1926) 1927, **24,** 195) reported, however, that examination of one square inch of faecal suspension, dilute enough to allow ordinary print to be read through it, will reveal hookworm ova if these, as measured by Stoll's dilution egg-counting method, number 600 or more to the gram (which implies on Stoll's computation 30 to 60 worms) and hold that the user of this technique may rest assured that persons negative to such smears properly examined were not suffering from hookworm disease.

(a) *The means of grading concentrative techniques.*

At all events there have come into use the well-known concentrative techniques aiming at collecting eggs uncamouflaged on a small area, which techniques themselves vary greatly in accuracy. Their worth has been estimated in one of three ways. First, their capacity to display under the microscope a multitude of eggs usually attested by a striking microphotograph, the most recent example being that of DE RIVAS ((1932) 1933, **30,** 206). Almost any concentrative technique will on occasions produce this effect; the method is without control and as a real test is valueless. Secondly, there has been used the comparison of positive results from the same faeces given by different techniques. This is the usual method of comparison. Its value is relative; for it is clear that all sufficiently heavy infections will be detected by the smear itself, but that as infections become progressively lighter techniques, which are being compared by their ability to detect eggs, will one by one cease to display them; they will arrange themselves in their relative values, but their real accuracy will not be shown. Thirdly, the attempt has been made to determine what percentage of eggs actually contained in a faecal specimen is collected by various concentrative techniques. This is the only really accurate method of appraisement, but before 1921 it had apparently been attempted only by BASS in 1909, HALL in 1911, LANE in 1918 and WRENCH in 1919. Nevertheless it is no easy matter to be sure of the real egg-content of faeces. The seemingly easy way is to count the eggs in a thin film of a measured quantity of faeces, but it is noteworthy that MHASKAR (1923, **20,** 640a) found that by floating such a film after counting it as a film there was an increased count of 14 per cent.

(*b*) *Egg-counting techniques.*

Of the three uses to which egg-counting techniques have been put—the determining of the worm-egg ratio, the measuring of the load of infection of a community, and the determination of the real efficiency of concentrative techniques by comparison of the ovum content of the faeces with the egg collection by any technique—the last clearly requires all the accuracy which can be obtained. Although the ordinary reader may well imagine from the claims made for it nowadays that egg counting and particularly " dilution egg counting " are new, nothing could be further from the truth. LUTZ, LEICHENSTERN and PARONA used them nearly 50 years ago, and it was just because they were a routine in his laboratory in 1897 that Looss was led to recognize the increase in his own hookworm infection which led to the discovery of the skin route of infection. Most of the controls devised to determine the egg content of faeces are dilution egg counting techniques. The methods of fifty years ago and Control D* used a watery faecal suspension, Control A suspended in water the centrifugal deposit from a strained faecal suspension, Control B used the faecal deposit without previous straining, Control C suspended in equal parts of water and of a quinquenormal solution of caustic soda, thus making a decinormal solution, Control E suspended the centrifugal deposit in a half-saturated common salt solution which has a specific gravity of 1,100. Stoll's technique (1923, **20,** 950) suspends faeces directly in decinormal caustic soda solution, and he and others commonly give it the distinctive name of " the dilution egg counting technique." The CALDWELLS (1926, **23,** 775) mix the faeces with 30 per cent. antiformin, an hour later add sugar solution with a specific gravity of 1,230, and mix by blowing air bubbles through it; it is a dilution-floatation technique. The Hamburg technique (HUNG (1926) 1927, **24,** 195; FÜLLEBORN, 1927, **24,** 1008) floats faeces in a saturated solution of common salt in a vessel of stated diameter and samples three-sevenths of the surface by floating coverslips on it. D.C.F.F., or direct centrifugal floatation pushed to finality, consist in repeating D.C.F., or direct centrifugal floatation 4 times and counting the eggs under the 4 covers as well as those obtained from the pour-off.

D.C.F.F. proved in LANE's tests (summarized (1928) 1929, **26,** 605) to have a higher average count and a smaller variation therefrom than did any of the other counting techniques, and he was accordingly forced to use it as his standard. He found that of the dilution egg-counting techniques the best was Control E, that which uses a salt solution with a specific gravity of 1,100 which seems to be about that of hookworm eggs. The maximum, average (in heavy type), and minimum collections were: Control A, 49, **37,** 26; Control B, 92, **75,** 39; Control C, 133, **50,** 12; Control D, 95, **50,** 39; Control E, 103, **82,**

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* The lettered controls are from LANE (1924, **21,** 574).

61; D.C.F.F., 114, **100**, 94. To his tests (1927, **24**, 542), Stoll's technique proved in his hands very erratic as compared with D.C.F.F. Stoll and Hausheer (1926, **23**, 776a) reported poor results with D.C.F.F. and tendered advice as to how it might be improved, and Soper held that the deposit in salt solution had to be stirred between the centrifugings before reasonably good results could be obtained, and that even so 35·6 per cent. of the eggs were not recovered. Lane (1927, **24**, 542) pointed out that in these tests his technique had been arbitrarily or deliberately altered, and showed that had it been carried out properly these objections would never have been made. The necessity of carrying out techniques exactly as advised before fair comparisons can be made was emphasized in the review of Mense's book (1929, **26**, 867) where the results of Hung's curious "Ersatz" for D.C.F.F. ((1926) 1927, **24**, 195) were quoted as if it were the real thing, and Stoll's and Willis's techniques and D.C.F. were incorrectly described. Stoll claimed accuracy for his technique on three grounds: (1) Individual counts from the same suspension vary within 10 per cent. of their average, (2) Counts from the daily faecal deposit from the same person are even, (3) Counts of other helminthic ova are even. Regarding these: (1) Lane ((1932) 1933, **30**, 55) pointed out that this had not been so in 25 per cent. of cases in Stoll's skilful hands (Stoll and Hausheer, 1926, **23**, 776a); (2) Stoll ((1924) 1925, **22**, 498) reported eggs per gram as varying from 400 to 1,330, and per day from 27,260 to 141,680 in formed stools, and maintained after 18 pages of discussion that the formula representing the real relationship between stool and egg count could be obtained by the formula*

$$\Omega = \frac{n.\Sigma xy - \Sigma x.\Sigma y.}{\sqrt{[n.\ \Sigma x^2 - (\Sigma x)^2]\ [n.\Sigma y^2 - (\Sigma y)^2]}}$$

(3) Soper (1926, **24**, 196) using trichuris to check evenness of suspension in 43 counts from the same suspension found that they varied from 8 to 42 with an average of 23, Lane's figures (1927, **24**, 542) being confirmatory. In the same paper the Caldwells' technique is reported as giving results varying as 1 to 4; Sinclair (1929, **26**, 553) obtained the same figure when eggs were estimated as below 3,000 per gram; the average, maxima and minima were as 1,367 to 1,190 when they were above that figure.

(*c*) *Concentrative methods.*

The physical methods which have been used to produce virtual or actual concentration of eggs are these.

Clearing.—To render faecal matter transparent, and thus display eggs, glycerine and cedar oil have been advocated (Hein, 1927, **24**, 978; Peverelli, (1928) 1929, **26**, 969; Kortenhaus, (1928) 1930, **27**, 446), but Curran reported that liquid paraffin and olive oil were equally effective (*China Med. Jl.*, 1928, **42**, 210). For colourless eggs the value of the procedure depends on the relative rates of clearing of them and of faecal matter; Lane's counts of hookworm eggs (1924, **21**, 574) showed that clearing immediately increased the egg numbers by 19 per cent. over those shown in the same smear examined uncleared, but thereafter they rapidly cleared and became relatively or actually invisible. For coloured nematode eggs, however, clearing is generally helpful (KORTENHAUS). CURRAN found it useful for non-operculated tapeworm eggs, practically valueless for the large trematode eggs, but of some value for the small ones. Its use is limited.

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*It is stated in explanation merely that Ω is $-0{\cdot}636 \pm 0{\cdot}073$, that x and y signify values not deviations, that the formula is that of Jennings, and that the probable error can be determined from Pearson's Tables.

Straining.—USAMI & KAMADA ((1921) 1923, **20,** 205) found that two-thirds of the eggs contained in a faecal suspension were retained in a gauze fabric through which it was strained; LANE's (1924, **21,** 574) comparison of Controls A and B showed a loss of 30 to 60 per cent. from straining through fine wire gauze. Straining causes great loss of eggs.

Floatation.—The fact known for nearly 30 years that heavy salt solutions penetrate nematode eggs much more slowly than they do most ordinary faecal matter, has been greatly used latterly to display them by making them float in a fluid whose specific gravity is heavier than themselves. A saturated solution of common salt, that generally used, has a specific gravity of just over 1,200 and not of 1,130 as WILLIS stated ((1921) 1922, **19,** 246)—a reminder that the best way to be sure of saturation and to avoid air bubbles is to boil the solution till a scum of crystals floats on the surface (LANE, 1923, **20,** 947). A three-quarters-saturated solution (s.g. 1,150) floats hookworm eggs as satisfactorily as a saturated one and floats much less other matter (LANE, 1925, **22,** 495), and is that of election for these eggs. GUILLINY ((1931) 1932, **29,** 37) showed that hookworm, ascaris and trichuris eggs did not begin to sink in a saturated solution till they had been in it more than an hour.

Floatation in an inverted funnel.—Whether gravity or centrifugal force were used, the egg collection in 12 experiments (LANE, 1923, **20,** 947) was 12 per cent. of the numbers shown to be present by counting techniques which are now known greatly to underestimate the egg content of faeces.

Surface tension has been used either to sweep faecal matter off a slide and leave on it hookworm eggs by virtue of the stickiness which they possess in water and lose in strong saline, or to pick up a surface film with any eggs which are floating in it.

Movements.—When eggs have been collected in a preparation movements of it may cause them to be herded at a particular spot.

It has become clear that of the physical methods used for concentrating eggs floatation is by far the most effective, but that for the success of any concentrative technique three principles must be strictly observed. (1) The stool must be completely disintegrated, eggs must be quite free of faecal matter before they can be collected apart from it (LANE, 1923, **20,** 947); (2) the amount of stool used must be enough to contain eggs if a single female worm is normally ovipositing and to allow for all loss which the selected technique may entail (LANE (1925) 1926, **23,** 261); (3) the technique must not be overtried, its limit of effective concentration must not be exceeded (LANE, 1923, **20,** 974).

(*d*) *Concentrative techniques.**

Gates's technique ((1920) 1921, **17,** 45) must be mentioned for its final herding of eggs by movements of the vessel containing them.

Willis's technique ((1921) 1922, **19,** 246) uses gravity floatation to bring the eggs into contact with a cover glass which overlies the floatation fluid. On lifting the glass, surface tension cuts off and brings away the fluid underlying it together with such eggs as are there. As originally described it was used in a dilution of one in six, which greatly exceeds its limit of effective concentration. SAWYER & SWEET (1924, **21,** 581) describe it as a simple and efficient test of the presence of hookworm infection. Compared with D.C.F.F. it delivered one-sixth of the eggs (LANE, 1925, **22,** 495). CHANDLER ((1925) 1926, **23,** 775) using a dilution of one in sixteen obtained very irregular results and collected 6·5 per cent. of the eggs which D.C.F.F., with an improvised apparatus, showed to be present. EARLE (1924, **21,** 764) found that 40 per cent. of cases diagnosed as negative by this technique passed hookworms when treated.

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*Techniques other than those here mentioned are found in **18,** 131; **19,** 658; **20,** 617; **21,** 194, 530; **25,** 447, 936.

Khalil's technique ((1924) 1925, **22,** 455) strains the faecal suspension through fine wire gauze, floats the precipitate in the inverted cone of an Erlenmeyer flask, and loops off the surface as in the Kofoid and Barber technique. Loss of eggs by straining and by floating in an inverted cone explain the fact that to LANE's tests ((1925) 1926, **23,** 261) it displayed 2 per cent. of the eggs which D.C.F.F. showed to be present. Its use in Egypt and an emphatic claim for its excellence nevertheless persist (KHALIL, 1931, **28,** 665).

D.C.F. (LANE, 1924, **21,** 574) produces thorough disintegration in water by vigorous shaking with a hollow cylinder, centrifuges, and floats the precipitate in a salt solution of s.g. 1,150 for hookworm eggs or one of 1,200 for those of ascaris or trichuris. Both solutions float hookworm eggs equally well, but the lighter floats much less unwanted matter than the heavier. Though ascaris and trichuris eggs need a s.g. of 1,300 to float them as well as one of 1,150 floats hookworm eggs, that of 1,200 floats in one spin about 44 per cent. of ascaris and 25 per cent. of trichuris eggs (LANE (1925) 1926, **23,** 261). Eggs of the hookworm type (trichostrongylus and ternidens) seem to float as readily as do hookworm eggs ; trematode and unfertile ascaris eggs float badly or not at all ; no counts have been made for cestode infections. LANE ((1932) 1933, **30,** 55) claims that egg counts show that it is the only technique which should be employed where accuracy is desired. Its collection compared with WILLIS's has been noted.

The second method of grading concentrative techniques—the extent to which they have in practice given positive results—although not scientifically critical, has significant value. HÄRLE, SÜTTERLIN & ZEISS ((1923) 1924, **21,** 192) in 878 children's faeces found that the Hamburg direct gravity floatation method gave 15 to 25 per cent. more positives than did a simple smear ; they dealt mainly with ascaris. HAUSHEER & HERRICK ((1926) 1927, **24,** 195) found that 18 of 70 covered smears one inch square were negative, but that all cases were positive to D.C.F. In Russia the methods of FÜLLEBORN, TELEMANN and the smear gave positive percentages of 75, 52 and 8 (1931, **28,** 175), infections being mainly by trichuris. MAPLESTONE and MUKERJI ((1929) 1930, **27,** 419) reported a group of 12 cases of which Stoll's technique disclosed hookworm infection in 4 and D.C.F. in 11. NIESCHULZ & HOFKAMP ((1930) 1931, **28,** 222) emphasize the value of D.C.F. in the search of worm eggs and coccidial cysts in dog's faeces, and point out that a negative diagnosis can be made in two minutes. GUILLINY ((1931) 1932, **29,** 37) found that as compared with Willis's technique the percentage of hookworm infections discovered by a smear was 73, of ascaris 93 and of trichuris 55. STOLL and HAUSHEER (1926, **23,** 776a) stated their belief that D.C.F. was the most accurate diagnostic technique available for hookworm eggs, and STOLL (1930, **27,** 971b) relied on it for detection of eggs of *Haemonchus contortus* when the number of eggs was less than 1,000 per gram. MAPLESTONE ((1932) 1933, **30**, 203) found that D.C.F. added 25 per cent. to the positives displayed by Stoll's dilution technique. This method of appraisement also puts D.C.F. at the head of the list.

(*e*) *Quantitative diagnosis.*

At the bottom of the egg counting which at present forms so great an element in estimating the load of intestinal nematodes in area or individual, is the assumption that the rate of oviposition is so regular and constant that by it the worm load can satisfactorily be determined.

Regarding counts on the same untreated persons BROWN ((1927) 1928, **25**, 464) followed four cases of infection with hookworm, ascaris and trichuris by Stoll's egg counting method for periods of 10 to 23 days, and concluded that egg production was a very constant phenomenon. The ordinary medical man attempting to estimate with exactness the worm load of an individual patient should accept this statement with caution. For example in Brown's case, followed for 23 days, the numbers, to the nearest thousand, varied for hookworms from 13 to 24 per gram and 129 to 3,459 per day, the numbers for ascaris being 8 to 20 and 111 to 2,116, while for trichuris, comparing two formed daily stools of 103 and 108 gm., the eggs were 439 and 112 per gram. Even six-day averages were too variable to give a sharp indication of worm load.

It will be recalled that, using dilution egg counts about 50 years ago, PARONA put the faecal egg content produced by each female hookworm as 42 per gram with a total output of 6,666 daily, while LEICHTENSTERN, checking dilution egg counts by autopsy put the eggs per gram as 47. Nearly 40 years later STOLL (1923, **20**, 951) put the figure as 44 for formed stools basing his conclusion on 4 cases, as 22 for mushy stools basing this on 2 cases, and as 11 for liquid stools, basing this on one case.

But he omitted to report any re-examination for eggs in 4 of his seven cases. In most of them there is then nothing to suggest that the numbers of eggs counted really corresponded to the number of worms recovered. Yet this figure and method of computation have been widely accepted and used. Nevertheless there is much evidence against it. DARLING ((1922) 1923, **20**, 254) puts the eggs per gram per female as 22 ; DAVIS ((1924) 1925, **22**, 499) as 177 for formed stools and 111 for unformed ones, but here, too, there does not seem to have been re-examination ; LANE's figures (1925, **22**, 495) for post mortem examinations varied from about 10 to 500 ; HILL ((1926) 1927, **24**, 196) using Stoll's count in 93 cases most carefully worked over had an average of 18·3 ; STOLL ((1929) 1930, **27**, 971) found that in two sheep infected with *H. contortus*, one had a worm-egg ratio 34 times greater than the other ; MANALANG (1927, **24**, 1006) had an average of 44 in 18 cases with extremes of 26 and 100 ; SCHAPIRO & NAUCK ((1931) 1932, **29**, 419) using the contents of the bowel at autopsy found the average twice as great as should be expected from Stoll's factors, while individuals showed large discrepancies. The allowance for consistency as between formed and mushy stools were put by DOCHERTY (1926, **23**, 767) as 52 to 40 ; LANE ((1930) 1931, **28**, 227) showed that the moisture content of stools of different consistencies did not fall in with Stoll's formula ; HERRICK (1928, **25**, 967) that when he made this allowance for dogs' faeces his results were less even. This allowance for consistency cannot then be maintained. An allowance for species of hookworm is necessary. Probably SOPER's conclusion (1927, **24**, 1006) that ancylostomes lay about twice as many eggs as necators will prove of general application. In this connexion the unwisdom of trying to determine by egg measurement in a heavy salt solution the species of hookworm to which they belong is shown by RODHAIN'S observation ((1930) 1931, **28,** 689) that in Ringer's solution the average loss of length in trichostrongylus eggs was 16 per cent. An allowance for age of worms is needful as dilution egg counts by Looss (1911) had shown, the faecal ovum content increasing fifteen times in the first 8 weeks following the beginning of oviposition. HERRICK confirmed this for *A. caninum* (1928, **25,** 967) and SARLES for *A. braziliense* ((1929) 1930, **27,** 422, 423). That an allowance was necessary for intensity of infection was first suggested by HILL ((1926) 1927, **24,** 196) by examination of persons infected mainly with necator; it was clearly demonstrated for *A. caninum* by SARLES ((1929) 1930, **27,** 423), for in his animals when the worm load was increased twelve-fold worm counts were only doubled. LANE having, equally with the abstractor of HILL'S paper in this *Bulletin*, missed this point, analysed HILL'S 93 cases independently on reading SARLES results, and found ((1930) 1931, **28,** 227) that when fewer than 300 worms had been recovered the daily egg output of each female worm was about 4,000, with between 300 and 600 worms it was 2,500, and with over 600 it was 1,500. For all these reasons he concluded that to attempt from egg counts to estimate the worm load of a community was a waste of time and money. EARLE & DOERING (1932, **29,** 423) next examined by logarithms the results of over 700 cases reported from various sources and concluded that decrease in egg production as worm density increased was sufficiently marked to make it impossible to obtain one factor for estimating worm loads from egg counts over the whole range of infection weight. CHANDLER'S work ((1932) 1933, **30,** 223) strengthens the precariousness of conclusions based on any worm-egg ratio, for he showed that inoculation of rats with larvae of *Longistriata* species reduced the egg output of *Nippostrongylus muris* by 90 per cent. This aspect of the matter does not seem to have been studied in man. By converging lines of evidence the belief that worm loads can really be measured by egg numbers is shown to be illusory. They can merely be estimated; and as pointed out in a note by the abstractor (1931, **28,** 170) this has actually been done in Ceylon with a minimum of labour when comparing the positives to a Willis technique with the laborious counts of a Stoll, for with one exception the nine districts examined were placed in the same order by the two. To spend time and money in making counts by any method in the hope of determining the real hookworm load of a community is merely unwisdom.

For ascaris, BROWN & CORT ((1927) 1928, **25,** 464) place the number of eggs passed daily by a female worm as about a quarter of a million, or 2,000 per gram; MORETTI ((1928) 1930, **27,** 974) put the daily output as about 100,000. For their detection, then, no concentrative technique will commonly be held needful; indeed the preoccupation will be whether some concentrative technique used for other eggs may fail to display these. For trichuris MANALANG (1928, **25,** 963) placed the eggs per gram as 310. BRUMPT, however, in his *Parasitologie* quotes MOOSBRÜGGER as reporting 3,000 eggs per gram posited by 447 female worms, or about 7 per gram per female. For *Fasciolopsis buskii* STOLL, CORT and KWEI (1927, **24,** 981) place the daily egg output as between 14,623 and 48,125.

(*f*) *Some miscellaneous points.*

For *Enterobius vermicularis*, whose ova are not normally posited within the bowel, diagnosis by perianal and rectal scrapings has been reported, mainly from Russia. DUBROWINSKI *et al.* ((1929) 1930, **27,** 442) found 72 to 100 per cent. of 757 cases examined in various institutions to be infected. TONKING ((1929) 1930, **27,** 445) reported higher figures in Kenya from nail scrapings than were disclosed by D.C.F. for taenia and enterobius infections, but for ascaris, trichuris and hookworm the reverse was the case. Unfertile ascaris eggs have been dealt with by GOLDSMIDT (1935, **22,** 487), and OTTO (1932, **29,** 751). *Ternidens deminutus* has been reported in considerable amount from South Africa by SANDGROUND ((1929) 1930, **27,** 468) and BLACKIE (1932, **29,** 401). Methods for collecting and preserving cestodes were described by WARDLE (1932, **29,** 748). PLAUT & VOGEL ((1928) 1930, **27,** 748) have pointed out that it is not possible to determine from sections whether a schistosome egg has a terminal or lateral spine.

ii. URINARY EXAMINATION.

To determine whether schistosome eggs passed after treatment are dead or alive HELMY suggested as a delicate test ((1930) 1931, **28,** 669) the cessation of ciliary movement of flame cells. For concentration of schistosome eggs in the urine TOMB and HELMY ((1931) 1932, **29,** 410) found an 80 per cent. increase in positives over smear examination by straining and sedimenting a faecal suspension. BARLOW ((1931) 1932, **29,** 36) has described a method for enumerating and preserving schistosome eggs for examination.

iii. BLOOD EXAMINATION.

BRUG ((1927) 1928, **25,** 471 and 1931, **28,** 171) discovered in the Dutch East Indies a microfilaria in human blood which he designated *Microfilaria malayi*, and described in detail the characters which distinguish it from *Mf. bancrofti*. KORKE ((1929), 1930, **27,** 987) appears to have found the same microfilaria in Orissa, India. RAO (1931, **28,** 683) found an unsheated microfilaria in an Indian prisoner and named it *Mf. actoni*. FÜLLEBORN (1929, **25,** 513) has pointed out how active contraction during life, and the action of various methods of killing and preserving them, alter the length of these embryos. DUNN ((1931) 1932, **29,** 770) has described a method for enticing adult filariae to leave a tissue after death, so that they can thus be collected.

iv. X RAY EXAMINATION.

This is conveniently considered here. In the intestinal canal ascaris has been disclosed by failing to throw shadows while lying within a barium meal (1931, **28,** 688; 1932, **29,** 417). In detecting calcified *W. bancrofti* the value of rays was shown by CHRISTOPHERSON (1929, **26,** 984). O'CONNOR, GOLDEN & AUCHINCLOSS (1930, **27,** 986) demonstrated from X rays combined with sectioning of tissues how extensive the distribution of these worms might be, living and calcified ones commonly lying near one another. BROUGHTON-ALCOCK and WEINBREN ((1930) 1931, **28,** 676), with the good offices of Professor LEIPER and Sir Arthur KEITH, showed that calcified cysts of *Cysticercus cellulosae* threw shadows about 6 mm. long, and those of *Trichinella spiralis* about 0·4 mm. long. The calcified guinea worm has been defined by its shadow, while an uncalcified one has, at least in part, had its extent displayed by injection into it of lipiodol (ROUSSEL, 1928, **25,** 972).

II. Subdirect diagnosis.

The detection and identification of helminths which have undergone some development since they left man has been concerned mainly with hookworms and schistosomes.

Hookworms.—For the convenient extraction of infective hookworm larvae from soil or cultures BAERMANN'S method of soakage in a water-containing funnel is in general use ((1917) 1922, **19,** 252). It is a convenient modification of Looss's technique. Its most easily reached description for English readers is that by CORT *et al.* ((1921) 1923, **20,** 242, a), in which F. K. PAYNE showed the importance of heat in adding to the number of larvae collected. HIRST (1924, **21,** 968) established how greatly its efficiency varied with the type of soil concerned. With a view to compactness, so that many cultures and extractions might be dealt with in an incubator, LANE devised a method (1928, **25,** 467) by which his small cultures were soaked in a petri dish and the extract examined in a glass box. His controlled tests showed (1932, **29,** 423) that it was somewhat more efficient than was BAERMANN'S, but that all larvae were not necessarily recovered from the latter unless the funnel were emptied. After 24 hours' soakage neither method necessarily displayed the full infectivity of the sample, indeed larvae might continue to appear for 7 to 8 weeks. FÜLLEBORN ((1921) 1923, **20,** 252) set the culture investigated on a layer of agar extending at least 3 cm. from its edge and noted the tracks of migrating larvae (hookworm or strongyloides) ; a piece may be cut out of the agar and filled with water with a view to collecting larvae.

Regarding culture for the detection of hookworm larvae LANE (1928, **25,** 467 ; 1932, **29,** 423) showed that when culture was depended on for the diagnosis of this infection, the cultures must be trapped by a water moat ; for extraction may disclose no larvae, which yet may be present in the moat, having migrated from the culture and been trapped as they left. The radical alteration which this observation makes in hookworm investigation and prevention does not fall within the present subject.

There has been discussion whether there are differences between larvae of ancylostomes and necators. HEYDON (1927, **24,** 1007) has summarized the differences which he finds.

Schistosomes.—FÜLLEBORN ((1921) 1923, **20,** 219) has described how moisture, heat and light may be used to liberate miracidia, which are then readily seen with a lens swimming in the containing vessel. Controversy has continued regarding the anatomy of the cercaria of *S. haematobium.* BETTENCOURT and DA SILVA ((1928) 1930, **27,** 457) pointed out that the reported differences in the number of glands cannot be put down to errors of observation, they must be due to errors of identification. Those cercariae which they have reported from Portugal came from a single pond from which animals were excluded but which washerwomen invaded. These were infected to the extent of 70 per cent. by *S. haematobium.* They had the unpleasant habit of passing urine in the water as they stood in it washing clothes, all the hundreds of cercariae observed were of the same type with 3 pairs of glands, and they produced *S. haematobium* in mice.

ARCHIBALD and MARSHALL (1932, **29,** 741) infected laboratory-bred snails from cases of urinary bilharziasis, infected *C. sebaeus* with the cercariae and recovered *S. haematobium* from them ; the cercariae had three pairs of penetration glands. The same writers ((1932) 1933, **30,** 210) using the same stringent technique concluded that the cercaria of *S. mansoni* has 5 pairs of penetration glands, 3 pairs of flame cells and 2 pairs of ciliated areas in the body, and one pair of flame cells in the tail, thus confirming in essentials KHALIL's observations ((1922) 1923, **20,** 220).

III. Indirect Diagnosis.

To actual clinical symptoms no reference need be made apart from creeping eruption. Of the recognition of disability produced by infection the main interest lies in the attempt to diagnose the load of infection which divides the sick from the carrier host. Antigen-based tests form a large section of increasing importance.

i. CREEPING ERUPTION.

In America interest in this matter was raised by KIRBY-SMITH ((1925) 1926, **23,** 407) who had seen 2,500 cases. WHITE and DOVE (1928, **25,** 701) implicated *A. braziliense* as the local cause, and were confirmed by SHELMIRE ((1928) 1929, **26,** 555). In Australia HEYDON (1929, **26,** 989) showed that both *A. caninum* and *A. braziliense* could cause it. In the mean time FÜLLEBORN ((1927) 1930, **27,** 425), whose interest in the subject dates as far back as 1908, showed partly on his own person that it could be produced by *Uncinaria stenocephala.* In these cases excision of skin displays an epidermal tunnel in which the larva lies. It is usually situated just under the stratum corneum, though SMITH and ELMES ((1928) 1929, **26,** 688) in Nigeria found one lying immediately over the dermis. Creeping eruption is of course not always due to nematodes.

ii. DIAGNOSIS OF THE INJURIOUS WORM LOAD.

For hookworms this has been undertaken with confidence by means of egg counts, it being assumed : first, that the oviposition rate is a measure of the worm load; second, that the technique used has sufficed to measure infection; and third, that the tests used to measure disability have been appropriate and adequate. Regarding the first point, the evidence collected above has shown that the worm-egg ratio is disturbed by so many factors that it must rest with those who use it to show that in any particular case it is reliable. Regarding the second, Stoll's technique, combined or not with Willis's, has been used. As has been noted, the former has proved unsatisfying in many hands and may fail markedly to detect infection which is present, and the latter may be very inexact. Regarding the third, GORDON ((1925) 1926, **23,** 262) modified Stoll's technique with the hope of making it more exact and relied on tests of haemoglobin, physique, general fitness, mentality and energy to detect disability. He concluded that there was no correlation between worm load and disability unless eggs numbered more than 15,000 per gram of faeces. SMILLIE and AUGUSTINE ((1925) 1926, **23,** 263) using Stoll's and Willis's techniques concluded that all persons with 100 worms or less may be advised that they do not need treatment. In a paper, published within six weeks of the first these writers (1926, **23,** 772b) reduced the critical figure from 100 to

25 ; and SMILLIE and SPENCER (1926, *Jl. Educat. Psychol.*, May, 314) concurred in the last on the basis of mentality tests. STILES (1927, **24**, 536) gave his reasons for concluding that these studies were being pushed to an illogical extreme. WAITE and NELSON had already in 1919 found disability from light infections. LANE (1932, **29**, 173, 1933, **30**, 55) disssented from the conclusions of GORDON and of SMILLIE and his colleagues on the ground that their diagnostic techniques did not necessarily detect and certainly could not measure the lightest infections, and that their disability tests were not necessarily appropriate ; and pointed out that, had the techniques been dependable, the right conclusion to draw from the figures furnished by the latter group would have been the lightest infections are actually a proved handicap. STILES (1927, **24**, 536) recorded ill effects from less than 20 worms and YENIKOMSHIAN and BERBERIAN (1932, **29**, 755) from 8, judged by the effects of anthelmintics. BLACKIE (1932, **29**, 401) showed that in schistosomiasis pathological changes might be extreme and damaging, although parasites were few.

iii. ANTIGEN REACTIONS.

During the last twelve years about 100 papers dealing with antigen tests have been dealt with in this *Bulletin*. Those cited below are such as the reviewer believes to have the greatest importance for practising medical men. The antigen has been obtained from worms of the same or an allied species. If the worm is imbedded in tissue, attempts to obtain the antigen pure, or at least strong, have been made for trichinella by BACHMAN (1928, **25**, 470) by thorough artificial digestion of muscle, for cercariae from snail's liver by TALIAFERRO, HOFFMAN & COOK ((1928) 1929, **26**, 534) by grinding this up and so letting the larvae free themselves from the tissue, and by FAIRLEY and JASUDASAN ((1930) 1931, **28**, 196a) for schistosome cercariae through the use of heavily infected livers of snails. FÜLLEBORN (1926) 1927, **24**, 529) described his technique for obtaining antigen from infective strongyloides larvae. All these antigens are then made from larval forms. TALIAFERRO and HOFFMANN ((1930) 1931, **28**, 214) and FAIRLEY (1931, **28**, 679) have used for filariasis adult *Dirofilaria* as antigen, the former dissolving it in saline, the latter in alcohol. KHALIL & HASSAN (1932, **29**, 741) for schistosomiasis have used adult *S. bovis*. The antigens have a group character and, so far as concerns bilharziasis, FAIRLEY pointed out in 1919 the greater potency of larval than of adult antigen, and (with JASUDASAN) that the alcoholic extracts of normal snail's liver show no antigenic property against bilharzia sera. Hitherto antigen-based tests have proved of little exactness except in infections where parasities live in blood or lymph. Three kinds are worth note.

Precipitin reactions have been obtained by BACHMAN (1928, **25**, 470) for trichinosis but did not appear until some 30 days after infection, by which time, as he points out, a human patient is dead or convalescent.

Intradermal reactions.—FÜLLEBORN ((1926) 1927, **24**, 527) found the immediate reaction specific for *S. stercoralis*, and suggested that the perianal wheals of infected persons are due to penetration there of infective larvae. For schistosomiasis FAIRLEY & WILLIAMS ((1927) 1928, **25**, 458) obtained clear immediate and delayed reactions with snail's liver infected with *S. spindalis*. TALIAFERRO and HOFFMAN obtained a 96 per cent. positive reaction in *W. bancrofti* infection, and FAIRLEY had excellent results with infections by loa, onchocerca, and *W. bancrofti*.

Complement fixation proved valuable in experimental schistosomiasis work by FAIRLEY and JASUDASAN ((1930) 1931, **28**, 198). Fixation occurred in all infected animals and in no others. In filariasis FAIRLEY (1931, **28**, 679) obtained results confirmative of skin tests and pointed out that the two tests appeared complementary—the intradermal detecting intracellular, and complement fixation circulating, antibody. The large amount of work done on them seems to be defining the directions in which these antigen-based tests are likely to be useful, but in the case of intestinal parasites inadequate care has been taken to determine whether in particular cases they are or are not present in the bowel.

BLACKWATER FEVER.

GIGLIOLI (George). **Epidemiological and Etiological Studies on Blackwater Fever in the Interior of British Guiana, 1923 to 1932.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 204–224. With 2 charts & 3 diagrams. [28 refs.]

This paper deals with observations carried out from 1923 to 1932 on the middle and upper Demerara River in the interior of British Guiana, in an extremely circumscribed and limited area, extending over 45 miles along the banks of the river from Christianburg to Malalli. The population of the district amounts to 7,550 and includes Europeans 65, Portuguese 95, East Indians 1,321, Negroes 3,752, Chinese 98, Aborigines 509, mixed races 1,695, and races not stated 15.

From January, 1923, to December, 1931, there were 12,502 cases of malaria and 63 cases of blackwater; many of the latter were treated repeatedly for relapses. The annual incidence of malaria and blackwater during this period is shown in a chart, as is also the monthly incidence of the two diseases from August, 1926, to June, 1928. The author then passes to a consideration of the relative incidence of blackwater in the various races. Details are given in two tables, from which it appears that the negro shows a high degree of immunity. This is remarkable, because the negro on the Demerara is, in the majority of instances, an immigrant from the coast towns and villages or from the mildly malarial West Indian Islands, where blackwater is practically unknown. Information is also given regarding the incidence of blackwater in the various age groups.

The author next considers the question of blackwater as a family and house disease. The occurrence of blackwater in certain families and houses is a striking characteristic of the epidemiology of the disease on the Demerara River. Of 63 cases 22 (35 per cent.) originated from only 9 families. Details are given. There follows a discussion on immunity in blackwater and the relation of quinine to the disease.

The following care the onclusions :—

"(1) Blackwater fever is the direct result of infection with special haemolytic strains or biological varieties of the *Plasmodium* and more especially of *P. falciparum*; such strains, for the present, cannot be morphologically or otherwise differentiated from the ordinary forms of malaria parasites.

"(2) The epidemiology of blackwater is governed by: (*a*) The geographical and local distribution and incidence of such haemolytic strains; (*b*) The degree of immunity of the population. Immune subjects may tolerate infection without giving clinical evidence of its nature by suffering from haemoglobinuria.

"(3) Immunity to blackwater presents the same characteristics as immunity to malaria; it is a relative or partial immunity, a condition of tolerance or premunition. It may be: (*a*) Racial, most evident in the Negro race; (*b*) Acquired, as shown by the relative immunity of the adult section of a settled, racially non-immune population in the endemic area and by the clinical course of relapsing blackwater fever in children.

"(4) In individuals infected with haemolytic strains the onset of haemoglobinuria may be determined: (*a*) By special virulence of the infecting strain; (*b*) By absence of immunity and impairment of general, non-specific resistance; (*c*) By contingent factors tending to break down the existing racial or acquired immunity; (*d*) By quinine. This drug favours haemolysis experimentally provoked in animals with many known substances. From clinical experience a similar action may be attributed to quinine in the genesis of some cases of blackwater. Quinine and malaria being everywhere intimately associated, this drug, without being specifically the cause of blackwater, acquires an altogether special importance as it tends to increase the incidence of the disease in those areas where haemolytic strains of the malaria parasites are endemic." *W. Yorke.*

MANSON-BAHR (P.). **Blackwater Fever in England—Clinical Aspects.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Nov. 30. Vol. 26. No. 3. pp. 225–230.

The author deals with the clinical records of twenty cases of blackwater observed by him in London during the last 13 years. In quite a large proportion of these cases Manson-Bahr had the opportunity of observing the patient before the onset of blackwater, whilst in 5 cases the cataclysm actually took place whilst the patient was lying in bed undergoing routine treatment for subtertian malaria. In not a single one of these 5 can it be said that the onset had been foreseen. There was no recognizable " pre-blackwater stage."

Of the 20 patients no less than 8 died. In 6 death was definitely due to blood destruction caused by the great haemolysis ; one was due to septicaemia from a parotid abscess after the patient had made a recovery from threatened suppression of urine, and one was due to lobar pneumonia, which also supervened upon suppression of urine. In every case the actual production of haemolysis appeared to be connected with the administration of quinine.

On the important matter of the " pre-blackwater state " the author writes as follows :—

" The recital of details of the onset of blackwater fever in the cases above would seem to indicate that the attack commonly develops without any previous warning ; but I do not think that this is always so, for I still believe that in some cases there may possibly be a recognisable clinical pre-blackwater state—that is to say a cachectic condition due to prolonged infection with the subtertian parasite. I would define the pre-blackwater state as a condition in which the patient has an enlarged and tender liver and spleen and who passes highly coloured urine containing urobilin and usually a cloud of albumin and in whose blood either scanty rings or developing trophozoites may be found and whose red blood corpuscles show much basophilic stippling. Out of this series I saw four cases in this condition a week or more before the onset of blackwater and was able to predict that such an occurrence was liable to take place. Of course one has seen many other cases in this condition in whom blackwater did not eventuate and the difficulty so far has been to be able to decide the dosage of quinine which such a person will tolerate and which will not provoke haemolysis."

[As the reviewer has already stated elsewhere, this line of argument appears to him to be illogical and very unsatisfactory. In the first place Manson-Bahr frankly admits that he was unable to forecast the development of blackwater in any of the 5 cases who were under his care in hospital before the blackwater cataclysm actually took place. The signs which he describes as indicative of the " pre-blackwater state " are typical of chronic malignant tertian malaria and to say that such signs are indicative of the " pre-blackwater state " appears to the reviewer to be the same as saying that any malignant tertian case is in the " pre-blackwater state." This is possibly true, but the difficulty is to say which of them is actually going to develop blackwater when given quinine. There is no doubt that if one predicts that all such cases of malaria are going to develop blackwater one would sometimes be right, but far more often one would be wrong. The reviewer has already pointed out that for some days before the development of blackwater the urobilin content of the urine may be consistently normal.] *W. Y.*

GUPTA (C. C. Das). **Three Fatal Cases of Blackwater Fever.**—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 28–29. With 1 chart.

In this paper clinical details are given of three cases of blackwater fever, one in a Chinaman and two in Hindus. In each case anuria set in early and the patient died of uraemia, notwithstanding intravenous injections of alkali and saline. *W. Y.*

DUFOUR (V.). L'hypocholestérinémie dans la fièvre bilieuse hémoglobinurique.—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 520–522.

ROBERT (Léopold). Quelques taux du cholestérol sanguin chez des bilieux hémoglobinuriques. [**Blood Cholesterin in Blackwater.**]—*Ibid.* pp. 522–525.

i. The author has estimated the cholesterin titre in the serum of a number of cases of blackwater fever at Antananarivo and at Dakar by means of the colorimetric method of Grigaut. In the severe cases the cholesterin averaged only 0·29 gm. per litre and in moderate cases it averaged 0·77 gm. per litre. Shortly before death in fatal cases there was only a trace of cholesterin in the serum, whilst in the cases which recovered it rose rapidly and sometimes exceeded the normal of 1·5 to 1·7 gm. per litre. In some cases parallel observations were made on the urea titre. As a rule, when hypocholesteraemia was very pronounced the urea titre was considerably increased.

ii. Details are given of 7 cases of blackwater fever in which serum cholesterin estimations were made either during the disease or shortly afterwards. These observations show that the cholesterin titre does not always follow the course described by FEYTE, viz., hypocholesteraemia during the acute stage, an increase of the titre at the beginning of convalescence and a hypercholesteraemia at the time of recovery.

W. Y.

VALCKE & BOURGUIGNON. Contribution à l'étude du traitement de la fièvre bilieuse hémoglobinurique. [**Treatment of Blackwater.**]—*Bull. Méd. du Katanga.* 1932. Vol. 9. No. 6. pp. 156, 159–160, 162–165.

Brief clinical details are given of two cases of blackwater fever. In the first the blood was negative; the urine gradually decreased in amount, anuria set in and the patient died. In the second the blood contained parasites, the urine was plentiful and the patient recovered. Both patients were given biocholine.

The authors write that as the result of their experience of the last twelve years they give quinine in blackwater only if the blood contains parasites or if, after cessation of the blackwater, fever suggestive of malaria makes its appearance. In the second of the above cases they gave three doses of 0·15 gm. of quinine 6 days after the urine had cleared; this was followed by haemoglobinuria which lasted a couple of days. The persistence of slight fever and general debility due to extreme anaemia suggested the necessity for a blood transfusion. This, which was performed 17 days after the disappearance of blackwater, was followed by a violent reaction and a recrudescence of haemoglobinuria. Ultimately, a course of liver extract was given and the patient recovered. *W. Y.*

BANERJEE (N. G.) & BRAHMACHARI (Phanindranath). **The Occurrence of Haemoglobinuria during Treatment of Malarial Fever with Atebrin and Plasmoquine.**—*Indian Med. Gaz.* 1933. Mar. Vol. 68. No. 3. p. 149.

Clinical details are given of a case of blackwater fever in which the following points are considered worthy of note :—

1. No haemoglobinuria developed when the patient was under treatment with quinine.
2. An attack of haemoglobinuria occurred when the patient was being treated with atebrin and plasmoquine.
3. The administration of the above drugs failed to avert an attack of haemoglobinuria. *W. Y.*

WAKEMAN (A. Maurice), MORRELL (Clare A.), EISENMAN (Anna J.), SPRUNT (Douglas L.) & PETERS (John P.). **The Metabolism and Treatment of Blackwater Fever.**—*Amer. Jl. Trop. Med.* 1932. Nov. Vol. 12. No. 6. pp. 407–439. [32 refs.]

The work described in this paper is based on observations of two cases of blackwater fever studied at Lagos [see this *Bulletin*, Vol. 26, p. 1015; Vol. 28, p. 13] on two cases of haemoglobinuria from other causes and on experimental observations on five dogs. The following summary is given :—

"The general similarity of the functional disturbances seen in the cases of tropical blackwater fever, hemoglobinuria from other causes and the experimental hemoglobinuria produced in dogs by transfusion with their own laked blood, indicate that both clinical symptoms and pathological lesions are essentially referable to intravascular hemolysis. This view is supported by pathological evidence secured from post mortem examinations of human cases and of the dogs used in these experiments.

"Anuria and lesser grades of renal functional impairment seem to be referable primarily to occlusion of the renal tubules with coagulated blood pigment debris. Actual cellular injury appears to play a minor part. The functional disturbances which attend the initial phase of the disease, vomiting and shock, provide conditions peculiarly unfavorable for the secretion of urine and, therefore, may play an important secondary rôle in the production of anuria or oliguria. The shock is seen only in severe cases with massive hemolysis and may well be quite similar in its origin to that following hemorrhage. The logical therapeutic procedure would seem to be early blood transfusion, where this is not precluded, as it was in case A-5680, by the appearance of abnormal blood agglutinins. Transfusions have already been recommended and utilized with some success.

"The initial vomiting, like the chill and temperature, resembles the symptoms that follow intravenous injections of any foreign protein. The cause of the subsequent vomiting is not clear. The result of emesis is, however, inevitably to deplete the salt and water stores of the body and thereby to diminish the materials required for the production of urine. The rational way to meet this situation would seem to be the parenteral administration of glucose and saline solutions. Such measures may, however, fail to achieve their purpose if the vomiting is permitted to continue. Oral administration of fluids, in the face of vomiting, may only wash more salt from the body. The withdrawal of all fluids by mouth and the substitution of parenteral saline and glucose solutions may, in these circumstances, put an end to vomiting, restore the body fluids to their proper composition and, by providing conditions more favorable to urine formation, accelerate the return of normal renal function and recovery

" The actual effects of the intravascular hemolysis appear to be extremely transitory Even without the intervention of the kidneys, in cases with the most massive hemolysis, both the pigment and the protein radicles of the released hemoglobin are removed from the blood with the greatest rapidity This affords a further reason for believing that early treatment by transfusion and infusion, might, by preventing suppression of urine and minimizing impairment of renal function, eliminate the later secondary effects of the disease

" No support has been found for the theory that acidosis occurs in blackwater fever to offer an indication for alkaline therapy The administration of bicarbonate in the cases described led to the development of alkalosis. In the more severe cases the alkali reserve was already somewhat above normal, before bicarbonate was given, presumably as a result of vomiting Baker and Dodds, in experimental studies of hemoglobinuria in rabbits, find that in an alkaline urine hemoglobin remains unprecipitated and unchanged, while in a highly acid urine ($pH < 5\ 8$) it is converted to methemoglobin and is precipitated if the salt concentration in the urine is excessively high These observations have been cited as new support for alkaline therapy and do afford a more rational basis for this mode of treatment than the acidosis theory did They also seem to offer an argument against the use of excessive amounts of salt solution It must be borne in mind, however, that the patient with extreme base depletion from vomiting will excrete an acid urine, even when the serum bicarbonate is extremely elevated and that the administration of sodium chloride will in this case, render the urine alkaline Furthermore, the urine after excessive vomiting contains minimal amounts of sodium chloride and the urinary concentration of this salt is not greatly increased by the administration of enough sodium chloride to restore the normal concentration in the serum Finally dilution of the hemoglobin in the urine by the provision of a large urine volume may more than offset the effects of both reaction and salt concentration ' *W Y*

BETTENCOURT-GOMES (S C) **Blackwater Fever.**—*Brit Guiana Med Ann for 1932* pp 148–155

A general account which requires no special notice *W Y*

VAN SLYPE (W) A propos de la fièvre bilieuse hémoglobinurique —*Bruxelles-Méd* 1933 Mar 5 Vol 13 No 18 pp 493–501 [47 refs]

UJLAKI (P) Over de therapie van zwartwater koorts —*Geneesk Tijdschr v Nederl Indië* 1932 Oct 25 Vol 72 No 22 pp 1537–1539

PLAGUE.

HIRST (L. Fabian). **A Rat-Flea Survey of Ceylon with a Brief Discussion of Recent Work on Rat-Flea Species Distribution in Relation to the Spread of Bubonic Plague in the East Indies.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1933. Feb. 1. Vol. 3. Pt. 1. pp. 49–113. With 4 figs text, 2 figs. on 1 plate & 1 map. [33 refs.]

The great interest of this work for the general reader lies in the discussion and proofs of the chain of events leading up to the occurrence of plague in a human community.

Ceylon, as an island with distinctive seaboard and inland features, lends itself very well to epidemiological analysis. Plague made its first appearance in Colombo in 1914. The statement therefore, that " shortly afterwards 16 *X. cheopis* were found among 200 fleas, mostly collected from rats in what is now the plague endemic area and main *cheopis* zone," gives the clue to the author's well-reasoned argument for the rat-flea species distribution being the paramount factor governing the spread of plague. This last statement is in fact his actual conclusion. In the survey which is here recorded the island has been divided into climatic or geographical areas—the low-wet, low-dry, submontane and montane zones. The low-wet zone is fertile, prosperous and relatively free from malaria, while the low-dry zone is sparsely populated, undeveloped, covered with vast tracts of jungle and subject to a high malarial incidence. Specimens of rodents were sent in from each surveyed station and were identified as *R. rattus* of the subspecies *kandianus*, *rufescens* and *kelaarti*, *R. norvegicus*, *Gunomys gracilis* and *Bandicota malabarica*. The predominant rat species searched for fleas was *R. rattus kandianus*. A list of the fleas which have been recognized on Ceylon rats is given : *Xenopsylla astia*, *cheopis* and *brasiliensis* ; *Leptopsylla segnis* ; *Stivalius phoberus*, *aporus* and *ferinus* ; *Seratophyllus tamilanus* ; *Ctenocephalides canis*, *felis felis* and *felis orientis* and *Echidnophaga gallinaceus*.

Colombo in the low-wet zone is also the chief town of Ceylon. The facts bearing upon plague in Colombo are of the utmost importance for the whole island. Colombo has a population of 284,000 and is in regular commercial communication with plague infected regions. As there seems to be no question that grain, particularly rice, has hitherto been the chief vehicle of *X. cheopis*, the chief carrier of insect plague, it is significant that 480,000 tons of rice and 20,000 tons of other grains are imported annually, mostly from Rangoon. The links of the chain which lead up to the introduction of plague are identified one by one. Thus " it seems clear that the conditions on shipboard along tropical and subtropical routes are especially favourable to the preponderance of the plague flea *X. cheopis* " and that " of all the links in the chain of infection between Rangoon and Colombo that of the ships is the strongest *qua* the flea species factor." One result of a ship rat-flea survey was to strengthen the case for systematic deratization of vessels on tropical routes and this is a measure to which Dutch, Australian and American authorities attach great importance. Within the port of Colombo itself plague has remained endemic only in that part where demolition and reconstruction of the rat-infested buildings has proved impracticable and where in any case it would have been useless because of the underground refuge afforded by an old untrapped drainage system.

The spread of plague into the interior of Ceylon has been slow. It took four years to arrive at the Kandyan plateau and eleven more years before plague was recognized in the upper montane zone, this delay is probably to be traced to regulation of the grain trade with the interior In the last few pages the author treats of the interpretation to be placed on the results of rat-flea surveys and makes comparison of his own with the experience in British India and the Dutch East Indies The flea-species factor, which reduces to the prevalence of *X cheopis* and *X astia* respectively, applies equally well to Ceylon as to South India A thorough-going confirmation has been obtained of the author's thesis that a "three-fold relationship exists between the distribution of *X cheopis*, grain storage of imports and plague"

W F Harvey

VAN DER WALLE (N) De ratten en de rattenvlooien van Makassar, enkele opmerkingen naar aanleiding van de voorgekomen pestgevallen [**The Rats and the Rat Fleas of Macassar.**]—*Meded Dienst d Volksgezondheid in Nederl-Indie* 1932 Vol 21 No 4 pp 263–276 With 2 figs & 1 folding plan [10 refs] English summary

This epidemiological study centres round the occurrence of plague in Macassar, of which the first case was observed in 1922 and the last in 1930 Here, as in other places and especially in Ceylon, a connexion is traced betweeen rice importation, the species of rat frequenting different localities and the efficiency of the flea *Xenopsylla cheopis* as a transmitter by comparison with *Xenopsylla astia*

The rat species of Macassar are *Rattus rattus diardii*, *R norvegicus*, *R concolor*, *Mus musculus* and *Pachyura murina* Plague infection was mainly observed in *R norvegicus*, on which both *X cheopis* and *X astia* were found in approximately equal numbers *R r diardii* furnished many more *cheopis* than *astia*, a proportion which was exactly reversed in the case of *R concolor* The fleas of *Mus musculus* and *Pachyura murina* were almost exclusively *cheopis* and *astia* respectively. Both rats and fleas were very differently distributed The species *norvegicus* (sewer rat) and *concolor* are numerous in Macassar while the house rats are comparatively few Those house, sewer and concolor rats captured in the harbour region had a higher index for *X cheopis* than for *X astia*, but the same rats caught in the town showed more *X astia* "The remarkable distribution of the two species of Xenopsylla may be explained by the presence of large quantities of rice, copra and dried fish in the harbour quarter'

W. F H

KOPSTEIN (Felix) De huis-ratten-fauna van Java en haar rol bij de metastatische verspreiding van de builenpest [**The House-Rat Fauna of Java and its Rôle in the Metastatic Spread of Plague.**]—*Geneesk Tijdschr v Nederl-Indie* 1933 Feb 14 Vol 73 No 4 pp 209–227 [17 refs]

The numbers of the various species of rats and mice, caught in houses, villages and in open country, are given in detail No difference could be found in the rat fauna of plague-infected and plague-free villages of West Java, except for a definite increase of *Pachyura murina* the house-shrew, in plague kampongs Little proof of contact between the rat species of the open country and those caught within houses could be established. Up till now, except for *Rattus rattus brevicaudatus*, no epizootics have been observed outside kampongs, nor is any other species of animal than the rat known in Java to be affected by epizootics. *W. F. H.*

SOUCHARD. Contribution à l'étude de la faune des rats dans la région Saigon-Cholon. Ses rapports avec l'endémie pesteuse. [**Rat Fauna in Saigon-Cholon, Cochin China. Relation to Plague.**]—*Bull. Soc. Méd. Chirurg. Indochine.* 1933. Jan.-Feb. Vol. 11. No. 1. pp. 60–66. [17 refs.]

An investigation lasting for 12 months was carried out on captured rats into the degree and character of their flea infestation. The result was that a total of 417 fleas was collected from 486 rats, of which 462 were *R. decumanus*, thus giving a flea-index of 0·85. This is a low index even though the great majority of the fleas were *X. cheopis* and the conclusion drawn is that while the two towns Saigon and Cholon are capable of infection by plague there is little likelihood of its assuming epidemic proportions. *W. F. H.*

FRÉVILLE. Contribution à l'épidémiologie de la peste en Cochinchine. [**Epidemiology of Plague in Cochin China.**]—*Ann. de Méd. et de Pharm. Colon.* 1932. Oct.–Nov.–Dec. Vol. 30. No. 4. pp. 653–679.

A general survey is made of climatic and geographical conditions, mode of invasion and history, prophylactic measures and rats and fleas in their relation to plague in Cochin China.

The two first cases of plague to be confirmed were notified at Saigon in 1906 and occurred in immigrants who had arrived by sea. Plague cases had already occurred in neighbouring countries, 1898 in Annam, 1901 in Tonking and in Siam since 1904. The spread of plague to the provinces was slow but more or less continuous up to 1918, from which year a progressive diminution set in. In 1931 only three cases were reported and it seems reasonable to hope that plague is very near its disappearance in Cochin China. Among the factors which account for this fortunate state of affairs are that the flea is rare in Cochin China and the proportion of plague-infected rats is extremely small.

W. F. H.

WASSILIEFF (A.). Les rongeurs et les puces de la Tunisie et leur rôle dans la propagation de la peste. (II. Révision des rongeurs de Tunisie—III. Revision des puces.) [**The Rodents and the Fleas of Tunisia and their Rôle in the Transmission of Plague.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 298–340. With 3 text figs., 2 plates & 2 folding charts.

The author supplies a much needed key to the species of rodents found in Tunisia and reviews the fleas of that region. He furnishes useful information of the mode of examining rodent burrows and presents a theory of the epidemiology of human plague in areas where apparently no epizootic has preceded it.

In the family of the Muridae there are two subfamilies of the *Gerbillinae* and *Murinae.* The *Gerbillinae* contain the genera *Psammomys*, *Meriones*, *Gerbillus* and *Dipodillus* while those belonging to the *Murinae* are *Arvicanthus* and *Mus*. It was found best to dig out the burrows of rodents rather than to use trapping. An occupied burrow was easy to recognize and these were quite characteristic for each species of rodent. Of the genera mentioned *Meriones shawi* predominated in the part of central Tunisia investigated and *Psammomys roudairei* in the interior to the south. This difference in fauna of the centre and the south may afford an explanation of the presence of plague in the former and its total absence in the latter. Although the fleas were collected from the rodents themselves, even larger catches were at times made from their nests, for the flea may leave the animal at the time of its departure from its burrow. A list of fleas which have been captured is given and some of these are new to Tunisia. A new genus, *Neocoptopsylla*, has been established.

The general observations with which the author concludes relate especially to the record of immigration of rodents into Tunisia from Tripolitania and to an explanation of the spread of plague. His own view is that there was not an immigration but a local and temporary increase of the rodent population. Plague seems to have entered from Tripolitania and a focus appears to have been established at Zarzis, whence it spread to the north and into the central region of Tunisia. This spread, according to Wassilieff, may have been of a passive type, either by man or by rodents whose parasites have also been a reservoir. The passage to the north probably was not by actual travelling of the rat itself, but of the rat in the baggage of nomads. If an intensive local increase of rodents is superadded to the transport of the reservoir of the virus, then the series of events which have led up, first to an epizootic and after that to an epidemic are explained. Even without an epizootic a single rodent, according to the author, may be the cause of plague, for which it is assumed that the flea ingests the plague bacillus from man and becomes the reservoir of the virus. On this hypothesis it would be possible to explain outbreaks of plague without an antecedent epizootic. *W. F. H.*

ADVIER (M.) & DIAGNE (A.). Observations épidémiologiques sur la peste à Dakar (Décembre 1932). [**Epidemiology of Plague at Dakar.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 388–389.

The occurrence of 19 cases of plague, 17 of them fatal, would not have required a note but for the fact that here was an instance which might have been claimed as interhuman infection. One family alone furnished nine cases with seven deaths. Five of these cases were bubonic and four pneumonic. The point of importance in this epidemic is that a search revealed dead rats, some of them mummified, which proved that an unsuspected epizootic had been going on for some considerable time. *W. F. H.*

ADVIER (M.). Sur l'épidémiologie de la peste au Sénégal. [**Epidemiology of Plague in Senegal.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 465–472.

Plague in Senegal has been represented as possessing peculiar characters, expressed as (1) that epidemics here develop independently of all rat infection, (2) that human plague is spontaneously recovered from in many cases, and (3) that pulmonary plague is not a serious disease and only slightly contagious. Each of these points is taken up by the author who concludes that (1) Senegal plague is in no way peculiar, (2) a rat epizootic or enzootic precedes and gives rise to epidemic or endemic, (3) the disease is usually transmitted from the rat to man by *Xenopsylla cheopis*, and (4) the contagiousness of pulmonary plague is dependent on atmospheric conditions, being due to projection of virulent particles on the mucous membranes of eye or nose. *W. F. H.*

GIRAUD (G.). Cas de peste pulmonaire primitive à Rufisque en 1932. [**Cases of Primary Pneumonic Plague at Rufisque.**]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 99–103.

The points made by the author are that pneumonic plague is probably more frequent in Senegal than has commonly been supposed. Some of his own cases have had no definite pulmonary symptoms and would scarcely have been diagnosed without the help of laboratory examination, after lung and liver puncture. All cases of rapid and sudden death, especially during an epidemic period, should be examined for the possible existence of pneumonic plague. *W. F. H.*

JORGE (Ricardo). A propos de la peste au Maroc et de la leçon de prophylaxie qui s'en dégage. [**Plague and its Prophylaxis in Morocco.**]—Reprinted from *Bull. Inst. Hyg. de Rabat.* 1932. Apr.–June. 20 pp.

Five centuries have passed since in 1415 the great King John landed as conqueror of Morocco. Plague was at the time ravaging the royal army and it is a moot point whether this was the cause of introduction of plague or whether it had been already prevalent in Morocco. By the 17th century plague had left Europe and was concentrated during the 18th century in Asia Minor, Turkey and Egypt. At the end of that century, in 1799, a terrible epidemic broke out in Morocco. Marrakesh lost 50,000 inhabitants and Fez 65,000. This was the last epidemic on a large scale to attack the old world in the West. Has plague continued to the present day in Morocco ? It would not seem probable. The natives know the disease and call it by the special name of bubonic plague. Plague had quitted Egypt, Turkey, Syria and Asia Minor by about 1844. It is unlikely that Morocco would be an exception to this general retrogression. In our own time plague made its appearance in Hong Kong in 1894 and began its pandemic career. The Moroccan epidemic is, in the author's opinion, only a regional phase of the modern plague period. He develops from this point his views on the diffusion of plague. Man or the rat each becomes dangerous as vectors once they begin to travel. New foci are created. The measures which are adopted to meet this particular danger are discussed in some detail.

W. F. H.

COLOMBANI. L'importance respective du rat et de la puce de l'homme dans les épidémies de peste au Maroc. [**The Relative Importance of the Rat and the Human Flea in Plague Epidemics in Morocco.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 562–566.

A tendency has been noticeable recently to attribute the propagation of plague in certain regions to inter-human agency, that is to say to the human flea. In this article, which has the authority of the Public Health Service, we have the insistence upon the essential importance of the rat, however difficult it may be in some instances to prove its connexion with an epidemic. Once started, an epidemic may be carried on by case-to-case infection, either by the human flea or by expectoration in pneumonic cases. The article concludes with the warning that although the destruction of rats is less easy than that of human fleas it is none the less indispensable. *W. F. H.*

DE VOGEL (W. T.). La vaccination antipesteuse à Java et ses résultats. [**Plague Vaccination in Java.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Mar. Vol. 25. No. 3. pp. 451–457.

There are very few really satisfactory attempts to estimate the value of a vaccine by using it on strictly alternate cases. This is, as the author properly insists, the " only method by which a clear idea of its real efficacy can be obtained." And yet vaccines against typhoid fever, cholera and plague have been used now for some forty years. It is apt to be forgotten that a comparison of results in volunteers with those who refuse vaccination is no comparison at all. The latter do not furnish a comparable control. It is, perhaps, the inconvenience of application of this method of alternate case test which has militated against its application.

In Java, however, an opportunity arose of trying out the method as a means of estimating the value of plague vaccine on a large population in a region where the disease showed a tendency to assume epidemic form. The vaccinated persons numbered 37,224 and the unvaccinated controls 39,004, while due regard was paid to similarity of age and sex distribution. Some of the vaccine used was of the type of a bacillary suspension in salt solution but most of it was of the Haffkine type of broth vaccine. The results obtained are expressed only in terms of mortality, not of morbidity, and amounted to a reduction in the mortality of about one-half. This result was not regarded by the Public Health Authorities of the Dutch East Indies as satisfactory. It was not demonstrative of a success sufficient to convince the populace of the desirability of a measure which would have to be repeated from time to time. Also it was argued that man stands outside the cycle of infection, which is one of rat and flea concern, although he may sooner or later become a victim. A decision was come to, therefore, that it was advisable to concentrate upon the gradual reconstruction of dwelling houses in order to render them unsuitable for a continuation of contact of man and rat. This method, so far as it has been able to be applied, appears to have been successful. The chief difficulty of making it general in Java has been its expense : its applicability in other countries, where other climatic conditions prevail, is doubtful.

W. F. H.

TAYLOR (J.). **Haffkine's Plague Vaccine.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1933. Mar. Memoir No. 27. pp. vi+125. With frontispiece & 20 plates. [26 refs.]

HAFFKINE came to India originally to investigate the efficacy of cholera vaccine and later became engaged in the manufacture and application of plague vaccine. The first cases of plague in Bombay, recognized as such, occurred in September 1896 and the first plague laboratory was started on 8th October 1896. It consisted only of one room and a corridor. From this beginning it has progressed through the stages of being the Plague Research Laboratory and the Bombay Bacteriological Laboratory to what is now the Haffkine Institute. It is becoming less and less easy to recognize these imposing buildings as the old Government House, Parel, or the plague incubating room as originally a church in the time of Portuguese sovereignty over Bombay. While the buildings devoted to bacteriology generally and plague vaccine in particular have undergone much transformation, it may be surprising to learn that the vaccine itself is very much the same as it was originally—a broth vaccine. This broth vaccine was considered to be an imperfect one by the Indian Plague Commission, on grounds which appeared perfectly sound at the time and which amounted to a declaration that the sediment was active for immunization while the supernatant fluid " does not lead to the elaboration of any substances which are capable of favourably modifying a plague attack." Experimental work has served to reverse this judgment ; it is only in very recent years, however, that studies on the antigenic constitution of the plague bacillus have thrown light upon the probable reasons for the efficacy of the fluid.

What is evidently an illustration from an old plate gives testimony to the primitive conditions under which large scale inoculation was and is carried out in India. Here can be dimly made out the doctors and their assistants, the beds which a man can easily take up and carry on his head, possibly a travellers' rest house in the background and the village folk, who by precept and example are being induced to accept inoculation. A great campaign of inoculation was launched in the Punjab in 1902 and came temporarily almost to a sudden end with what is known in the history of plague vaccination as the Malkowal disaster, when nineteen persons developed tetanus after inoculation with the contents of one bottle of the prophylactic. The explanation of the fact is to some extent still controversial, but nothing like it has occurred since, although plague inoculation has been carried out on a very large scale in India. The unfortunate event " threw a shadow over Haffkine's life and seriously affected his career." If we can, without again raising argument on the subject, derive a lesson from that event, it is that the addition of half per cent. phenol to materials for large-scale inoculation is a precaution which contributes greatly to safety of procedure and peace of mind. One result of the disaster was the invention of the Maynard apparatus for bottling vaccines, which is used in India for all the prophylactic vaccines and curative sera manufactured in government laboratories. It has not only the advantage of preservation against outside contamination but of speed in filling and it provides an easily stored sample of the contents of each plague phial. A summary of the present methods of manufacture completes the first part of this interesting history.

One most important fact both as regards the biological testing of plague vaccine and the epidemiology of the disease has emerged in the course of the manifold experiments conducted at the Haffkine Institute. The Bombay rat was found to possess a high natural immunity to plague as compared with its brother rat of Madras. The one population had for years been ravaged by the disease, whilst the other had escaped. This demonstrable immunity in an ordinarily susceptible animal, would, apart from its explanation by natural selection, seem to offer a fascinating immunological problem for study. In fact, plague, a disease which affects animals and man alike, affords a very special field of bacteriological research. The large-scale experimental work which is recorded in this memoir is itself testimony to the recognition of this fact. *W. F. H.*

JORGE (Ricardo). *Summa epidemiologica* de la peste épidémies anciennes et modernes. [**Epidemiology of Ancient and Modern Plague.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Mar. Vol. 25. No. 3. pp. 425–450. With 3 figs. [Refs. in footnotes.]

Much history and much theory are discussed in this communication and some quaint illustrations accompany it. Plague may be said to have exhibited two cycles in Europe. Why have there been two separate cycles and why has the return of plague in the cycle of this century been so different from the first, such an attenuated plague ? The virulence has been the same; so also has been the symptomatology. It is the epidemicity which has altered and particularly the power of rapid diffusion. By the 18th century Europe was free from plague, which had retreated to its original fold in the Asiatic hinterland. The replacement of Venetian maritime supremacy, which occurred with the discovery of the Cape route to India, the dissolution of the Hanseatic League and the discovery of America have all a bearing on the disappearance of plague. The possibility of the vectors of plague having changed is very thoroughly considered as an explanation, and in the author's opinion this is a probable explanation of much of the difference in character of ancient and modern plague in Europe. The black rat was not introduced to Europe until after the Crusades and the brown rat not until later still. The epizoodemic theory of plague cannot be accepted as satisfactory for the genesis and propagation of ancient epidemic plague. It will explain neither the disappearance of plague from Europe nor the relative immunity of Europe in modern times. The reason for the difference is to be looked for in a change of type of transmission. Ancient plague was not, as is modern plague, a rat and rat-flea propagated plague. It was a human and human-flea transmitted plague, in which the pneumonic type was very prevalent and accounted for the rapidity of spread of old-time epidemics. The same mode of carriage may occasionally be found at the present day, nor need the human carrier himself be affected with plague, for he may be the bearer of plague fleas. Ancient plague was, then, to a very considerable extent, if not exclusively, inter-human while modern plague is bubonic and rat-borne. *W. F. H.*

HIRST (L. F.). **The Protection of the Interior of Ceylon from Plague with Special Reference to the Fumigation of Plague-Suspect Imports.**—52 pp. With diagrams & 2 plates. 1931. Colombo: Municipal Printing Office, Ceylon.

This brochure provides an excellent discussion on the introduction and propagation of plague in its relation to rats, fleas and grain, together with practical chapters on cyanide fumigation.

The objectives considered are the eradication of plague from Colombo, the protection of highland Ceylon from grain-borne plague and the protection of lowland Ceylon from further invasion. Bubonic plague is primarily a disease of rodents carried by fleas; man himself is of comparatively little importance in the spread. Merchandise also is not a cause of direct infection; its rôle is, however, very important for the conveyance of plague and "is proportionate to the extent to which it has been infested by plague rats and fleas." Of all types of merchandise grain is now considered as the most important because it is a favourite food of rats and "its débris forms a suitable diet for the larvae of the plague-carrying fleas." Transference of infection overseas or overland has very definite dependence on the duration of life of the plague infected rat and the plague infected flea. A rat will usually die "within a week of being bitten by the infected flea," and it is at least safe to say that the female infected *X. cheopis* may survive at most for one week and the male for 4 days. With longer periods than this it is inferred that a plague epizootic has occurred on ship board, the link between the shore and the ship being a plague rat or more probably a plague flea. Migration of animals as a factor in the spread of plague is unimportant where rats are concerned. The imported rat *R. norvegicus* wanders further than *R. rattus* which "may explain the greater extent and persistence of plague and the more uniform distribution of the flea *Xenopsylla cheopis* in the plague endemic area in Colombo." True field rodents on the other hand, such as squirrels and gerbilles, do migrate and this may be an important factor in the spread of plague in other lands. The part played by the fleas *X. cheopis* and *X. astia* respectively is dealt with in some detail as might be expected from the pioneer work done by the author in this connexion.

Immunity of various parts of India, Burma and Ceylon is explainable on the basis of the prevalence of the efficient plague vector *cheopis* and the inefficient vector *astia*. The proper criterion of flea prevalence, as it relates to plague, is the specific flea index and not a simple flea percentage. A marked difference is naturally shown between those of the two fleas. It is between 1 and 2 for *cheopis* and nearer 7 for *astia*. These few facts, taken from a much fuller treatment of the subject, go to confirm the dictum that —"The control of the grain trade and the proper storage of grain are almost synonymous with efficient plague preventive measures." For Ceylon it is rice that is the grain whose importation requires to be controlled. More than 70 per cent. of the enormous quantities imported to Ceylon comes from Rangoon, which was till recently the port most heavily infected with oriental plague. Bombay shares with Rangoon the distinction of being the most important external source of plague for Ceylon. The difference in seasonal incidence of plague in the several towns concerned in outgoing and incoming plague receives special consideration. In this respect human plague incidence serves as a fairly good index to the amount of rat plague existent at any given time, when due allowance is made for the fact that the maximum incidence of the epizootic is some weeks earlier than that of the epidemic. The length of the voyage between Rangoon and Colombo is just about two days too long for direct transference of infected fleas and it is obvious therefore that if the grain carrying ships between these two ports are kept free from rats they will not carry plague. Danger lies in the occurrence of a plague epizootic among the ship rats. Climate is another important factor in the spread of plague. Thus *X. cheopis*, the plague carrying fleas, will not transmit plague when the mean temperature exceeds 80°F. and this applies to Colombo and the low-country of Ceylon for many months of the year. On the other hand in Kandy and other highland stations plague might spread at almost any time of the year.

All these considerations, of which merely mention has been made, will be found exceedingly helpful to the medical officer in all lands who is concerned with the prevention of entry of plague to a port and its spread to the interior. The treatment of the subject of cyanide fumigation as given by the author will also repay perusal. *W. F. H.*

ADVIER (M.). Etude d'un bactériophage antipesteux. [**Study of a Plague Bacteriophage.**]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 94–99.

The points studied are, (1) the range of action and potency of isolated phage for various strains of *Past. pestis*, (2) duration of preservation, (3) the use of this bacteriophage in infected animals and in man.

The bacteriophage was isolated from the blood of a patient in Senegal, whereas those of other workers have been isolated from stools or from sewage. Lytic potency was fully preserved for 8 months at laboratory temperature. In no case was a secondary culture observed. Forty-seven strains of plague bacilli, all of different origin, were subjected to the action of the phage and all were lysed. No lyso-resistant strain has yet been met with. This phage appeared to have a high degree of specificity, for it was inactive against *Bact. coli*, other intestinal organisms and even against *Past. pseudotuberculosis rodentium*. If an agar surface were treated with the bacteriophage it ceased to be able to grow *Past. pestis* while still continuing favourable to the growth of other germs. This may afford a method for diagnosis of plague or the plague bacillus. Experiments to test prophylactic and therapeutic action in infected animals were all failures and there seemed even to be some indication of sensitization. Trials in man were not sufficiently numerous or definite to permit of precise conclusions. Thirty-five cases of bubonic plague treated by bacteriophage furnished 20 recoveries and, where the plague bacillus was isolated from blood or gland juice, it was always lyso-sensitive to the phage used. *W. F. H.*

BONCINELLI (Umberto). Studio su un germe del gruppo Pasteurella, isolato del ratto bianco. [**Study of a Pasteurella of the White Rat.**] —*Boll. Istituto Sieroterap. Milanese.* 1932. Dec. Vol. 11. No. 12. pp. 834–854. With 2 figs. on 1 plate. [95 refs.] German summary.

The organism was isolated from a spontaneously affected rat. In its characterization it is allotted a position intermediate between *P. pestis*, *P. pseudotuberculosis rodentium* and *P. pluriseptica*. The author discusses its relationship to plague-like organisms in general and the significance of these organisms for the epidemiology of plague.

W. F. H.

WEBSTER (W. J.). **Notes on Indian Plague Rats.**—*Indian Med. Gaz.* 1933. Apr. Vol. 68. No. 4. pp. 214–216. [10 refs.]

These notes should prove useful to those for whom they are intended —" health officers and others who have to deal with plague outbreaks."

One source of confusion in the literature of plague is due to the frequency of change of nomenclature. The genus "Mus" of Linnaeus (1758) referred to rats, mice, and other rodents such as guineapigs. An example of the way in which nomenclature has altered is afforded by the long-tailed house rat, which by virtue of " its numerical density, wide distribution and domestic habits, coupled with its specific flea infestation . . . is by far the most important species of rat as far as plague in India is concerned." This rat was first known as *Mus rattus*, then as *Epimys rattus* and is now named by English-speaking naturalists *Rattus rattus*. It is sometimes referred to as the black rat but it may be brown in colour and the so-called brown rat (*Rattus norvegicus*) may be black, while either may be grey. A useful table is given of characters distinguishing the genera, *Rattus*, *Bandicota*, *Gunomys* and *Nesokia*. The last three should at least be recognized and distinguished from *R. rattus* and *R. norvegicus*. Some of the distinguishing characters of mice of the genera *Mus*, *Leggada* and *Legadilla* are also given. *W. F. H.*

MICHELETTI (Ettore). Sulla diagnosi della peste murina. [**Diagnosis of Rat Plague.**]—*Ann. di Med. Nav. e Colon.* 1932. Nov.–Dec. 38th Year. Vol. 2. No. 5–6. pp. 677–687.

The importance of the diagnosis of plague in the rat is well recognized and there is often difficulty in making it with dead animals in a state of decomposition. Methods have been devised to overcome this difficulty. If spleen smears, fixed in methyl alcohol, are treated for at least half an hour, and better still for longer, with a-naphthylamine solution, the plague bacilli present their typical bipolar character. It is also extremely useful, especially in decomposed animals, to make diagnostic cultures from the bone marrow, because in this way pure growths may be obtained. Bone-marrow smears are also preferable, for the same reason, to those from the spleen. To obtain the most rapid development of the cultures the author uses a nutrient bouillon composed of 1 cc. grain infusion to 5 cc. broth. The well known chain growths of the plague bacillus are obtained by sowing in liver broth. By incubation at 30°C. instead of 37°C. for 48 hours it is possible to avoid the appearance of involution forms and to maintain the virulence unchanged. Even in ordinary nutrient bouillon the plague bacillus produces a certain amount of nitrous acid. This production of nitrous acid—and no culture can be called plague which does not produce it—may be increased by the use of special media. A positive result is obtainable with old cultures, as well as from recently isolated strains.

W. F. H.

KONSTANSOFF (S. W.). Latente und chronische Formen der Zieselpest im Zusammenhang mit der epidemiologischen Beleuchtung der Zieselpest-Epizootien. [**Latent and Chronic Forms of Ziesel Mouse Plague, their Significance for Ziesel Plague Epizootics.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Feb. 23. Vol. 127. No. 7/8. pp. 440–450. [27 refs.]

The ziesel-mouse epizootic of 1930 in the Ural region was strikingly peculiar because (*a*) the disease was not fatal, (*b*) there was no transmission to man and, (*c*) it showed a latent chronic form of infection without a single observed case of acute infection. Enlargement of external glands was insignificant. No symptoms of disease were manifest. One or more small nodules were found in the spleen and liver and cultures made from nodule-containing organs provided a pure culture of ovoid bacteria similar in morphological and cultural characters to *Past. pestis*. Guineapigs were inoculated subcutaneously with the organs of the ziesel mouse or infected by rubbing an emulsion of the organ on the scarified skin. They died in 5 to 5½ days with the symptoms of a plague infected animal, typical bipolar bacilli in the blood and small necrotic foci throughout the spleen and liver. More common than this type of infection, however, was a chronic one, developing in 10 to 12 days, with suppuration at the site of inoculation, purulent buboes and large caseous masses in kidneys, lungs and liver. Smears from the caseous masses showed only involution forms but cultures were quite typical. When a cutaneous instead of subcutaneous method of infection was adopted, either the animal developed no infection at all or was temporarily indisposed and showed post mortem a chronic type of infection.

The explanation of this epizootic may take two forms: either it is a disease *sui generis* or it is true plague of very little virulence for rodents and none for man. Such explanations are of high importance for the epidemiology of plague. According to the author " the conditions of transmission of plague infection at the time of an epidemic and the mode of spread of an epidemic are not yet really known. Fleas and other biting insects are only rare and accidental vectors and play no actual part in the spread of plague." That " the part played by rodents in the epidemiology of plague is not one of propagation of infection is demonstrated by (1) the existence of epizootics without simultaneous epidemics, (2) the development of 'plague epidemics without participation of rodents, (3) the not infrequent absence of any parallelism between the curves of the plague epidemic and the plague epizootic, and (4) the want of coincidence between the beginning and end of epidemic and epizootic."

What the author, holding these special views, considers is now necessary is to investigate the latent and chronic forms of plague in animals, and especially to carry out cross immunization experiments with the bacilli of plague in the ziesel mouse and the bacilli of human plague.

W. F. H.

JAN-KERGUISTEL (A.). Note sur une épidémie de peste pulmonaire survenue en saison chaude à Tamatave. **[A Hot-Weather Epidemic of Pulmonary Plague in Tamatave, Madagascar.]**—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 5–6.

The peculiarity of the outbreak, which was proved bacteriologically and attacked four persons in all, was its occurrence during the hot season.

W. F. H.

KNIGHT (H. W). The History of Bubonic Plague and Personal Experiences —*New Orleans Med. & Surg. Jl.* 1933. Mar. Vol. 85. No. 9. pp. 672–678. With 3 figs.

LU (T. H.). The Plague Epidemic of 1931 in Shansi and Shensi Provinces (China).—*Jl Oriental Med.* 1933. Feb. Vol. 18. No. 2. [In Japanese English summary p. 19.]

PONS (R.). Au sujet de la communication de M. Advier : " Etude d'un bactériophage anti-pesteux."—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 385–387.

CHOLERA.

CHAN (Eugene) & YANG (Neo Karl). **Cholera in Shanghai.**—*Jl. Philippine Islands Med. Assoc.* 1933. Mar. Vol. 13. No. 3. pp. 162–168. With 2 diagrams.

In this study we find a disclaimer of the possibility of cholera being endemic in China. Two cholera epidemics have been observed, one in 1930 and one in 1931. Owing to the very efficient examination of stools instituted in Shanghai it has been possible to follow these epidemics from the first case to the last and they are set out very clearly week by week as frequency distribution curves.

This distribution was, for the 1930 epidemic beginning on 28th August and ending on 18th October, 3, 10, 18, 20, 18, 8, 6, and 4, a range of 8 weeks in all. In 1931 the epidemic was very similar with a longer duration. Details were given also of the age, sex, and social status distributions of the cases. Cholera vaccine had been used preventively before the occurrence of the epidemics and none of the immunized persons is known to have been attacked with cholera.

W. F. Harvey.

KUROYA (Masahiko) & OSHIO (Kempu). **On the Types of Cholera Vibrio of the Shanghai Epidemic of 1932.**—Reprinted from *Bull. Shanghai Sci. Inst.* 1932. Oct. Vol. 2. No. 1. 10 pp.

The types of the authors are referable to vibrios, of which initially the " original type " (Inaba) was a virulent and epidemic strain and the " variant type " (Ogawa) a weakly virulent sporadic strain. A " middle type " (Kikojima) falls between the original and variant types. The fifteen strains investigated were obtained at the early period of the 1932 epidemic and subjected to agglutinin-absorption tests. Twelve of these were of " variant type " and three, although primarily of variant type, approximated to the so-called " middle type."

W. F. H.

SHODA (T.), KOREYEDA (T.), KODAMA (T.), OKAMOTO (K.) & OTOMO (T.). **Bacteriological Examination of Cholera Vibrio conducted at Kobe Port in 1932 during a Period when Several Foreign Ports were designated as Cholera-infected Places.**—*Jl. Public Health Assoc. Japan.* 1932. Dec. Vol. 8. No. 12. pp. 1–6.

Passengers and crews arriving at Kobe from infected ports had their stools examined for the detection of cholera carriers. This rule applied to steerage passengers and subordinate crews, seldom to cabin passengers and ships' officers. During a period of 150 days 21,916 persons in all were examined by a simple peptone water culture technique in the first instance and three definite cholera carriers were found. Apart from the three definite cases 196 others were investigated further and 11 cholera-like vibrios isolated. Ten of these were quite negative to cholera agglutinating serum while one exhibited a co-agglutination effect.

W. F. H.

Shahin Pacha (Mohammed). L'examen bactériologique des selles des pèlerins égyptiens, pour l'année 1932, à leur départ d'Egypte et à leur retour du pèlerinage. [**Examination of Pilgrims on Departure and on Return for Cholera.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Jan. Vol. 25. No. 1. pp. 85–86.

The stools of 1,532 pilgrims were examined before departure and were entirely negative. On their return journey at Tor the stools of 2,262 were examined, two of which furnished agglutinable vibrios and six non-agglutinable vibrios. The agglutinable vibrios were found in the first case in a pilgrim whose stools had not been examined before he set out and in the second case in a collective tube of ten stools, but with negative result upon examination of the individuals singly.

W. F. H.

Jude & **Millischer**. La protection des états sous mandat français contre l'épidémie de choléra qui a sévi en Irak dans l'été 1931. [**The Protection of French Mandated Territories against Cholera in Iraq.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Jan. Vol. 25. No. 1. pp. 74–84. With 1 chart.

The first two parts of this article deal with the measures taken and bacteriological observations [*ante*, p. 170]. The third part deals with the difficulties of application of the International Sanitary Convention.

The Baghdad-Damascus route is of great importance and Baghdad is in direct communication by rail with Basra and the Persian Gulf, which are regular foci of cholera. It was an embarassing situation for the sanitary authorities at Damascus to find a high proportion of carriers of agglutinable cholera vibrios among travellers, all of whom had been vaccinated. Some of these were of high social position and came from Baghdad where no case of cholera had been reported. The pronouncement of the Committee of the International Office of Public Hygiene of May 1931 seemed to be applicable :—" Healthy carriers of cholera vibrios ought to be considered no less a danger. . . . Vaccination appreciably diminishes the risk of importation of cholera but does not banish it entirely." A decision was then made to submit all travellers without distinction to examination of their stools. It is to be hoped that in case of a new epidemic, investigation for healthy carriers will be practised on a large scale, if not for prophylactic, at all events for scientific purposes. *W. F. H.*

Morgan (M. T.). Sur la signification des porteurs sains de vibrion cholérique et sur les effets de la vaccination anticholérique parentérale sur les vibrions de l'intestin. [**The Significance of Healthy Cholera Carriers and the Effect of Parenteral Vaccination on Vibrios.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Jan. Vol. 25. No. 1. pp. 89–94.

A number of questions are asked in this article, evidently for the purpose of urging the necessity to provide answers.

The serum of healthy carriers does not show more antibody content than that of the normal individual. Have specific antibodies little or no effect on the causative organism contained in the intestine of a healthy carrier and is this due to the interposition of an immune barrier ? Can healthy carriers be sterilized ? Recent work would seem to show that this can be done—by bacteriophage at Tor and by ingestion of anticholera vaccine in Syria. Anticholera vaccination only affords an appreciable immunity by the 9th or 10th day after the first inoculation. If then such vaccination is of prophylactic value for the individual detained in quarantine, is it justifiable to permit his release before the 5th day? Experience so far obtained seems to indicate that it is not advisable to be too active in regarding healthy carriers as a very great danger. Investigations of such points as these is very important for the present day traveller or pilgrim. *W. F. H.*

BIFULCO (Carlo). Patogenesi del colera asiatico. Nota II. Genesi dei portatori di vibrioni colerigeni. **[Pathogenesis of Cholera. Cholera Carriers.]**—*Riforma Med.* 1933. Apr. 1. Vol. 49. No. 13. pp. 478, 481–483.

In the author's first note (*ante*, p. 170) it was contended that the cholera syndrome is brought about by the arrival of a sufficient dose of vibrios, via the portal system at the liver, their exaltation in the liver, and their arrival in the intestine by way of the bile. This explanation, which is supported by experimentation in the rabbit and now in the dog, is to some extent that of SANARELLI—the penetration of the mucous membrane of the mouth by the cholera vibrio and its arrival *a tergo* by the circulation at the intestine and at the liver. The presence of vibrios in the gall bladder is not due to an ascent from the intestine and multiplication in the bile. Infection of the liver is a primary condition, while that of the intestinal contents is secondary. Elimination of cholera vibrios in convalescence or later will depend on the condition of the liver which may be greatly injured in cholera. The slowness of repair in the liver may be the explanation of the duration of persistence of the carrier state. A healthy carrier would be an individual in whom a dose of vibrios had arrived at the liver which was insufficient to produce the cholera syndrome; the vibrios then would not have their virulence exalted by the liver and would produce no symptoms This would also serve to account for the fact of less virulence and less persistence of the vibrios in the healthy carrier than those of the cholera case or of the convalescent. *W. F. H.*

BERNARD (P. Noël) & LIANG (Wang). Remarques sur quelques souches de vibrions cholériques isolés en Indochine et sur les variations de leurs caractères sous l'influence du bactériophage. **[Variations in Some Cholera Vibrio Strains of Indo-China induced by Bacteriophage.]**—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 146–151.

These authors have applied themselves to a confirmation of the results obtained with bacteriophage by DOORENBOS (this *Bulletin*, Vol. 29, p. 682). Sixteen strains of vibrio having all the classical characters of cholera were at their disposal. These were agglutinable, non-haemolytic and sensitive to bacteriophage.

One of these strains was taken and subjected to the action of phage, which cleared it completely. A secondary culture appeared 24 to 48 hours later and was sown on gelatin agar. It was this secondary culture which formed the object of study. The original pure strain, not acted on by bacteriophage, agglutinated in 2 hours at 1 in 4,000, showed haemagglutination with the erythrocytes of horse, sheep and guineapig and was very sensitive to bacteriophage. The secondary culture on the other hand only agglutinated at 1 in 500 after 24 hours, gave haemagglutination, and was only partially lysed by bacteriophage, a lysis too which was quickly followed by secondary culture. Other characters of the secondary strain were that bouillon and peptone water cultures were less abundant, the pellicle less well developed, colonies on agar more dry, less transparent and sometimes wrinkled. The proteolytic power was diminished.

A series of cultures on gelatin agar at intervals of 24 hours was now made of the bacteriophage-modified strain and a gradual return to the characters of the original strain was obtained after the seventh subculture. All the other strains in the authors' possession were tested out in this way; some did and some did not undergo the modification described. *W. F. H.*

BERNARD (P. Noël) & GUILLERM (J.). Sur la lyse transmissible du vibrion cholérique. [**Transmissible Lysis of the Cholera Vibrio.**]—*C. R. Acad. Sci.* 1933. May 1. Vol. 196. No. 18. pp. 1339–1341.

By the use of a technique for extraction of diastases the authors have obtained an amorphous powder capable of giving rise to transmissible lysis.

They counter the objection, which was certain to be advanced, that such a powder might contain no more than a single living corpuscle of d'Herelle, and yet be able to bring about transmissible lysis, by using a 24 to 48-hour bouillon culture containing no lytic principle. Such a culture is treated with the gel of orthohydroxide of aluminium to obtain on the one hand a bouillon exhausted by adsorption and on the other a liquid obtained by washing (elution) the gel in distilled water of pH 7. Both these liquids, after concentration, treatment with saturated ammonium sulphate and centrifugation, give precipitates which are dried. These powders are very unstable and must be used immediately after dilution in bouillon of pH 7. The colloidal solutions obtained show, with young cultures of the vibrio from which they were derived, a transmissible lytic power, weak to begin with, but becoming enhanced with passage. Of the two fluids treated it is the exhausted bouillon which contains most of the lytic substance, and this fact leads the authors to the view that the aluminium gel does not adsorb the lytic principle, although some of it is mechanically carried down. Adsorption, therefore, removes impurities and leaves the lytic principle behind, which would make the procedure adopted comparable to the adsorption of proteolytic pancreatic enzymes by aluminium gel to leave behind a purified trypsin in the mother liquor. *W. F. H.*

MICHELETTI (Ettore). Ricerche sulla pluralità dei tipi sierologici del vibrione colerico. [**Plurality of Serological Types of the Cholera Vibrio.**]—*Ann. di Med. Nav e Colon.* 1933. Jan.–Feb. 39th Year. Vol. 1. No. 1–2. pp. 23–34.

In Japan two types of cholera vibrio have been isolated in epidemics, called the typical and the atypical, with agglutination titres respectively of over 1 in 6,000 and up to 1 in 400 only. The El Tor vibrio is included among the atypical.

In this investigation the author deals with the problem of the existence of a single serological type for the cholera vibrio. Eleven strains were collected, of various origin, one of which was an El Tor vibrio from a carrier. All these strains were positively agglutinated by the laboratory serum (titre 1–10,000) in the dilution 1 in 8,000. The research consisted in a cross agglutination test of each strain by each of the sera belonging to each strain. As a conclusion the author affirms the unity of type of the cholera vibrio. In the absence of a definitely standard cholera serum it should be justifiable in practice to take the agglutinating vibrio as a cholera vibrio and the non-agglutinating as not a cholera vibrio. *W. F. H.*

GHOSH (H.). Préparation de la toxine cholérique. Action pathogène expérimentale. [**Preparation of Cholera Toxin ; Pathogenic Action.**]—*C. R. Soc. Biol.* 1933. Apr. 1. Vol. 112. No. 12. pp. 1176–1177.

This record is of the growth of a strain of cholera anaerobically in Martin's peptone bouillon of pH 8. An intravenous injection of 2·5 cc. filtered 20-hour culture in a fasting rabbit produced extreme thirst in 2 or 3 minutes and extreme exhaustion in 2 hours. Recovery took place by degrees. An injection of 0·75 cc. is made 4 hours later and repeated next morning. " If the characteristic diarrhoea did not occur overnight, it was certain to appear within 30 minutes after the third injection." The toxin is precipitated by ammonium sulphate, furnishes in the rabbit an agglutinating serum of a titre 1 in 5,000, and is destroyed by heating 30 minutes at 100°C. *W. F. H.*

BRAULKE (Hellmut). Form- und Wachstumsveränderungen bei Vibrionen. [**Form and Growth Changes in Vibrios.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1933. Apr. 8. Vol. 115. No. 1. pp. 25–46. [11 refs.]

In the past fifty years there have been many attempts to describe not merely variability but a much wider range of variation in the forms of bacteria. Such variations have been designated pleomorphism, cyclogeny, etc. In a recently promulgated theory of dimorphism, the B-form to which all rod-shaped bacteria belong is said to be able to go over to a C-form, of coccus type and this latter is capable of cultivation. Not only so, but in a pure culture of bacteria protozoa-like organisms may emerge from the bacteria, with which they have been living in symbiosis. These new organisms have been called " Pettenkoferia."

The author has occupied himself largely with the action of lithium chloride upon vibrios in his treatment of these views and has come to the following conclusions :—1. The so-called " Pettenkoferia " organisms are giant or irritation forms of growth of bacteria which have developed as the result of pathological changes brought about by the action of salts such as lithium chloride. 2. The habituation of vibrios to a lithium chloride containing medium can be so complete that a quite normal growth results. When these lithium-accustomed bacteria are weaned from their new medium and returned to normal media they pass through the same series of abnormal forms before becoming normal again. 3. The granules which develop out of vibrios are not capable of further development and are not to be regarded as gonidia, nor are the cultures which contain them filtrable. 4. Processes, however, have been observed in old cultures which to some extent correspond to an attempt at sexual propagation. 5. The C-forms of gram-positive coccus culture type, which have been described as arising from all bacillary forms, are nothing but latent contaminations.

6. Forms of vibrio are described which are astonishingly like protozoa.
7. Longitudinal division of vibrios is described as undoubtedly occurring. *W. F. H.*

LINTON (Richard W.) & SHRIVASTAVA (D. L.). **Carbohydrate Fractions from *Vibrio cholerae*, and Related Organisms.**—*Proc. Soc. Experim. Biol. & Med.* 1933. Feb. Vol. 30. No. 5. pp. 600–603.

In this study of the important carbohydrate composition of bacteria of the vibrio group three fractions were separated by alcohol precipitation from the ultimate hydrolysate obtained.

Fraction I is a dark reddish gum. Fraction II was the same in all the vibrio strains studied and " appears to consist of glycuronic acid and galactose." The third fraction, left behind in the hydrolysate, is a single sugar—galactose for (1) a smooth agglutinating vibrio recently derived from a case of cholera, and for (2) a rough, non-agglutinating strain derived from the above by the action of bacteriophage ; arabinose for (3) a rough, weakly agglutinating strain, and for (4) a water vibrio, smooth and non-agglutinating. So far then it would appear that " the chemical difference between the specific substances of the pathogenic vibrio and the water vibrio lies in the possession of galactose by the first and of arabinose by the second " and that " the smooth-rough transition brought about by bacteriophage action does not change the character of the carbohydrate nor does the change from the agglutinable type have any effect upon the specific substance." *W. F. H.*

LIU (S. H.), WANG (S. H.) & FAN (C.). **Acidosis in Cholera. I. Path of Displacement of Serum Acid Base Equilibrium. II. Changes in Serum Electrolytes.**—*Proc. Soc. Experim. Biol. & Med.* 1933. Jan. Vol. 30. No. 4. pp. 417–418 ; 419–420.

These two studies deal with the biochemistry of the blood in cholera. In the acute stage acidosis was always present and the values of serum pH, bicarbonate content and CO_2 tension were 7·28, 14·1 and 30·7 respectively. These are to be compared with the normal values of 7·40, 26·6 and 44·9. Intravenous saline or alkaline therapy brought the pH back fairly rapidly to normal and this was followed by the return of bicarbonate. During convalescence a tendency to alkalosis developed. In the acute stage " besides decrease in pH and bicarbonate content, there is a distinct reduction in serum total base and chloride concentrations and an elevation of phosphate, lactate and to a lesser extent proteins." *W. F. H.*

DEL FAVERO (Ernesto). Sul comportamento del vibrione colerigeno di fronte a temperature elevate. [**The Action of High Temperature on the Cholera Vibrio.**]—*Arch. Ital. Sci. Med. Colon.* 1933. Jan. 1. Vol. 14. No. 1. pp. 47–50. With 2 figs. English summary (7 lines).

The cholera vibrio after fifteen days of subculture at an elevated temperature loses its virulence for the rabbit. It is possible, however, to restore this virulence by a series of passages. Originally the strain of vibrio in the author's possession was capable, when one loopful of culture was injected directly into the small intestine, of producing convulsions, collapse and death in about 24 hours. This virulence was lost after serial cultivation at 41°C. By five passages in rabbits the virulence was once more restored. With cultivation of the vibrio at 41°C., another property was acquired, that of resistance to the lethal effect of a high temperature. Thus the normal vibrio kept for 5 minutes at 52°C. gives a scattered growth, while the vibrio which has become habituated to a temperature of 41°C. gives a confluent growth.

W. F. H.

ALOMIA (Angel). Brief Report of Cholera Epidemic in Daram Island, Samar.—*Monthly Bull. Philippine Health Serv.* 1932. Dec. Vol. 12. No. 12. pp. 696–703.

FUENTES (L.). Cholera Outbreak in Barrio San Roque, Lingig, Surigao, February–March, 1930.—*Monthly Bull. Phillippine Health Serv.* 1932. Mar. Vol. 12. No. 3. pp. 89–93. With 1 map.

FUENTES (L.). Cholera Epidemic in Hinatuan, Surigao, from August to September, 1930. *Monthly Bull. Philippine Health Serv.* 1932. Mar. Vol. 12. No. 3. pp. 94–106.

LING (Chao-Chi). Cholera Bacteriemia in a Case of Typhoid Fever.—*Chinese Med. Jl.* 1932. Nov. Vol. 46. No. 11. pp. 1092–1095. [13 refs.]

MAGHERU (Georges), MAGHERU (Alice) & MIHAILESCU (G.). L'action du goudron sur le vibrion cholérique.—*C. R. Soc. Biol.* 1933. Jan. 13. Vol. 112. No. 1. pp. 88–90.

NOBÉCHI (Keizo). Les types immunologiques du vibrion cholérique au Japon. *Bull. Office Internat. d'Hyg. Publique.* 1933. Jan. Vol. 25. No. 1. pp. 72–73.

TOOTELL (George T.). Choleraic Diarrhoea. Notes from a Station Hospital.—*Chinese Med. Jl.* 1933. Jan. Vol. 47. No. 1. pp. 58–60.

TSURUMI (Mitsuzo). Porteurs de germes du choléra.—*Bull. Office Internat. d'Hyg. Publique.* 1933. Jan. Vol. 25. No. 1. pp. 87–88.

BERIBERI AND EPIDEMIC DROPSY.

NICOLLE (G.). Au sujet d'une poussée épidémique de béribéri dans les troupes indigènes. [**Beriberi in Natives at Dakar.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 507–512.

ROBERT (Léopold), LONG, FEYTE & DAREYS. Une épidémie de béribéri à forme humide observée à Dakar en 1932.—*Ibid.* pp. 512–516.

LAMBERT (L.). Y a-t-il une épidémie de béri-béri dans la population indigène de Dakar.—*Ibid.* pp. 516–518.

ADVIER (M.). Sur la bactériologie du béribéri.—*Ibid.* pp. 518–519.

An entire session of the Medico-Chirurgical Society of West Africa was devoted to an epidemic of beriberi observed in Dakar during 1932. The wet form of the disease, with gastro-intestinal and myocardial lesions predominating, comprised nearly all the cases. The mortality was relatively high because slight cases may have been classified under other heads.

The following is a brief summary of the papers :—

(1) G. NICOLLE.—Epidemiological studies of 33 beriberi cases, with 10 deaths, occurring among indigenous soldiers. Rice constituted 37 per cent. of the local diet, while that given in France had only 25 per cent. of rice. This excessive quantity of rice, together with the difficulty of procuring fresh food, vegetables and fruit at certain seasons, played an important part in the causation of the outbreak. Palm oil in the local diet by setting up gastric stagnation and fermentation was found to be another harmful factor. Lessening the amount of work, varying the diet especially as regards fresh fruit and vegetables and replacing ¾ of the polished rice with ¼ of red rice, proved satisfactory prophylactic measures.

(2) ROBERT, LONG, FEYTE and DAREYS.—Discussed clinical and post mortem findings. Under the former heading may be mentioned the absence of neuritis ; while in the latter sclerosis of the pancreas with firm adhesions between that organ and the duodenum is remarkable.

(3) LAMBERT.—Dealt with the presence of beriberi among the indigenous population of Dakar. During September, October and November 1932, 33 cases presenting oedema, cardiac symptoms and sluggish or absent tendon reflexes were admitted to hospital. Of these cases, 18 proved to be wet beriberi and 11 died, some of extremely sudden cardiac failure. All the patients were poor and their diet was deficient both absolutely and relatively.

(4) ADVIER.—Laboratory investigations gave no evidence of a specific pathogenic organism. *A. D. Bigland.*

FABRY. Réflexions cliniques sur 163 cas de béribéri. [**163 Cases of Beriberi.**]—*Ann. de Méd. et de Pharm. Colon.* 1932. Oct.–Nov.–Dec. Vol. 30. No. 4. pp. 694–708.

Beriberi is the result of a toxi-infection and the various forms of the disease represent different degrees of the same condition.

In 1931, 163 cases of beriberi were observed. Of these, 32 were of the wet type, 92 dry and 39 mixed. The death rate was 78 per cent. of the " wet " cases, 4 per cent. of the " dry " cases and 29 per cent. of the mixed type. Dry beriberi, chronic from the beginning, is evidently the manifestation of a slight attack ; while the wet form may arise out of this condition or begin suddenly *de novo*. A clinical unity exists between the different forms of the disease and this view is confirmed by finding in two chronic cases a positive blood culture after " biotropisme provoqué." The organism thus isolated resembled that found in the blood of a febrile case of the wet type.

Among other observations the following may be mentioned:—Beriberi in the large majority of cases is a toxi-infection which evolves slowly and without perceptible clinical signs. This latent state may suddenly become active, particularly as a result of some other infection. Polyneuritis is often the first grave clinical sign. Even in acute cases it is extremely probable that there is a pre-existing " organic instability " and that polyneuritis and other acute symptoms are only manifestations of differing intensity of the same latent condition. Chronic avitaminosis may be associated with the toxi-infection.

A. D. B.

STEVEN (George H.). **Pathological Notes on Cases resembling Wet Beriberi occurring in British Guiana.**—*Brit. Guiana Med. Ann. for 1932.* pp. 84–91.

A pathological condition, the main symptom of which is oedema, occurs in British Guiana. Whether this should be classified as beriberi or epidemic dropsy is still doubtful. The former seems to be the more probable diagnosis.

In 1927 GRACE investigated cases of oedema and nephritis in the Colony. Out of 71 post mortems on such cases carried out by the author in that year, 31 showed only a condition of cardiac failure with dropsy and no gross primary organic lesions in the heart, lungs, liver or kidneys. It was only towards the end of this series that a diagnosis of wet beriberi was made. Pathologically there was evidence of degeneration in the peripheral nerves and supra-renal glands, together with generalized oedema and distension of the heart, especially of the right auricle and the veins opening into it. Those chiefly affected are East Indians living in rural districts and existing almost entirely on white or parboiled brown rice. Many recover with dietary improvement but are liable to relapse after leaving hospital. *A. D. B.*

CRUZ (J. da Costa) & VIANNA (Ary). Sobre o emprego de revulsivos no beri-beri. (Nota prévia.) [**Counter-irritants in Beriberi.**]—*Brasil-Medico.* 1933. Feb. 18. Vol. 47. No. 7. pp. 113–114.

Dr. Carlos CHAGAS, with the notion of testing for the presence of some infective or toxic element acting on the peripheral nerve endings in beriberi, suggested the applicaton of a blister to the limbs with a view to obtaining fluid for inoculation and culture. The results of the latter were negative but to the surprise of Dr. CHAGAS and the authors there was an almost immediate benefit.

Notes are given of ten patients, of whom the following are examples. The patients came to hospital with swelling of the legs, numbness, oedema, inability to walk and shortness of breath. A blister [mosca de Milão, ? cantharides] was applied to each leg, and as soon as fluid appeared, usually in 24 hours, the numbness and weakness disappeared, the odema was much reduced and the dyspnoea was no longer troublesome. In some who had lost the reflexes, these did not immediately return, but the improvement in the other symptoms remained. This is attributed to " raising of the nervous tone " [whatever this may mean], and the explanation vouchsafed is that in beriberi there is not as a rule serious degeneration of the nerves but merely functional disturbance which is relieved by revulsives. The results were certainly very striking. *H. H. S.*

AALSMEER (W. C.). Ueber den Einfluss der Lugollösung auf den Adrenalineffekt bei Basedow und Beriberi. [**Influence of Lugol's Solution on the Adrenalin Effect in Beriberi.**]—*Klin. Woch.* 1932. Dec. 17. Vol. 11. No. 51. pp. 2111–2113.

It is probable that thyroid dysfunction is present in beriberi. The administration of Lugol's iodine solution gives good results in the treatment of the disease.

The favourable action of Lugol's iodine solution in cases of Basedow's disease can be demonstrated by the disappearance of the so-called adrenalin effect, *i.e.*, falling of minimal blood pressure after subcutaneous injection of 0·5 mgm. adrenalin. A similar satisfactory result after the administration of Lugol's solution was obtained in 3 cases of beriberi. Thus it seems probable that in beriberi a thyroid dysfunction exists and that the disease may be regarded as a pluriglandular syndrome produced by B-avitaminosis. It is claimed that beriberi therapy has been enriched by the use of iodine and that this remedy has been successful even when a vitamin-rich diet had failed to bring about a complete cure. *A. D. B.*

AALSMEER (W. C.). De cardiazol-adrenaline proef bij beri-beri. Het pseudoshoshin. [**The Cardiazol-Adrenalin Test in Beriberi. The "Pseudoshoshin" Condition.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Mar. 14. Vol. 73. No. 6. pp. 374–384.

There have been previous references in this *Bulletin* (Vol. 28, p. 460 and Vol. 29, pp. 92, 614) to the cardio-vascular symptoms in beriberi and to the effect of adrenalin on the minimal blood pressure as a test for the continued activity of the disease. The author has now found that the adrenalin test may fail although the disease is not active, owing to a left heart decompensation along with right-sided insufficiency. Such a result would be apt to lead to a diagnosis of the grave "shoshin" condition, which develops with progressively active beriberi. A slight modification of the test, however, elicits the effect once more. The administration of cardiazol shortly before the adrenalin acts as stimulant to the left heart and brings about the fall in the minimal blood pressure, which is the essence of the test. Controls were instituted to show that the result was not obtained in cases which were not beriberi. The author considers it necessary to differentiate from the "shoshin" condition one which he names "pseudo-shoshin": in this condition a chronic relapsing slight beriberi (slight avitaminosis) and muscular overstrain lead to a decompensation with very similar symptoms. The prognosis of pseudo-shoshin is, however, considerably better than that of shoshin. *W. F. Harvey.*

BURNETT (W. A.). **Report on Investigations into the Problem of Oedema.**—*Sierra Leone Ann. Rep. Med. & San. Dept. for Year 1931.* Appendix H. pp. 81–118. With 2 plates. [33 refs.]

Outbreaks of oedema occurring in Sierra Leone are more allied to epidemic dropsy than to beriberi. The disease is due to histamine-like toxins formed in rice during storage.

The author summarizes his views as follows :—

"Oedema at the Freetown Prison, Wilberforce Barracks, and Kissy Asylum is not that of beriberi (avitaminosis) but . . . is akin to epidemic dropsy. It is not associated with any lack of or diminution of accessory food substances, as vitamin "B," which has been supplied in copious amounts to the inmates of these institutions, nor is it allied with protein starvation. The disease is essentially one of autointoxication, due to absorption of highly poisonous nitrogenous putrefactive products, engendered in old rice by the activity of organisms acting in hot and moist conditions and producing bodies of a nature allied to the histamine-tyramine groups. The toxic substances are water soluble, especially in hot water, and they are capable of withstanding boiling water, without considerable alteration of their poisonous principles. This last observation is important, as recommendations have been made in former epidemics that the rice water should be saved and added to the soup.

"The disease-producing grain has a musty odour and, generally with discolouration, displays the presence of decomposition and of fungoid activity. Consumption of such foodstuff is fraught with great danger, resulting, *inter alia,* in the rapid onset of oedema of an extremely fatal nature.

"Rice forms the staple food of the Colony and owing to a rapid extension of swamp-rice farming during the past three years an export trade in it is anticipated. Oedema, therefore, becomes a matter of serious concern, especially where it is known that apart from its incapacitating effects this condition is attended by a very high mortality among consumers of rice which has been permitted to become decomposed." *A. D. B.*

CALCUTTA MEDICAL JOURNAL. 1933. Jan. Vol. 27. No. 7. pp. 195–228.—**Discussion on the Etiology and Clinical Aspects of Epidemic Dropsy.**

——. pp. 229–269. With 22 figs. (5 coloured).—**Discussion on the Pathological Aspects of Epidemic Dropsy.**

An account of a series of meetings held in September 1932 at the Calcutta Medical Club, upon the subject of epidemic dropsy in its clinical, pathological and epidemiological aspects.

Section 1. *Etiology and clinical aspects.*

Dr. NANDI opened the discussion. Epidemic dropsy is entirely distinct from wet beriberi. In epidemic dropsy the absence of peripheral neuritis ; the presence of fever, gastro-intestinal troubles, diarrhoea and the mottling of the skin ; the absence of the disease in sucklings ; the presence of glaucoma, piles, haemorrhages from mucous surfaces and acute pulmonary oedema are distinguishing features. Something in the diet, whether micro-organisms, adulteration or lack of essential factors, is responsible for the disease. Bengalese are commonly affected but Europeans and Marwaris escape. The mustard oil theory of causation is no longer tenable. It seems probable that changes occurring in rice due to storage are responsible for the disease. Treatment is empirical. Bread, meat and fresh fruit are useful preventives. Vegetarians should take dal, chapati, home-made bread and milk, and ghee. The Indian habit of eating ginger and soaked gram in the early morning is to be encouraged.

In the long discussion that followed only some of the remarks can be briefly recorded.

Dr. GHOSH suggested that the toxin responsible for the disease might be a histamine-like substance produced by the action of a fungus on rice. Certain cases derived benefit from *Bact. coli* vaccine. The hydrogenated vegetable oil " Vanaspati " is not the cause of the disease. Dr. DUTT. Marwaris are not affected because they use flour made by themselves. The disease is not communicated from man to man; women are most often attacked because in Hindu families they are apt to be insufficiently fed; cases in children have been recorded. Dr. BHADURI gave a detailed account of glaucoma in epidemic dropsy. The chief clinical features of this condition are (1) high tonometric reading. (2) Normal or deep anterior chamber, as opposed to the shallow one seen in other varieties of primary glaucoma. (3) Early appearance of halos round light. (4) Absence of inflammatory onset. (5) Frequency of haemorrhage after decompression of the globe. (6) Satisfactory results from trephining in a large majority of the cases.

Section 2. Pathological aspect of epidemic dropsy.

Dr. DE opened the discussion and dealt with the autopsy findings in four cases. The following are among the important points :—(1) The abdomen on being opened presented an appearance like a " sheet of blood " and the appendices epiploicae were hard and of a purplish red colour. (2) Subcutaneous tissues showed extensive vascular dilation in the subcutaneous fat. These areas are not " haemorrhagic " but " haemorrhagic-looking." Histologically, enormously dilated capillaries were found in the deep layers of the skin just where the adipose tissue begins. This is the characteristic change in epidemic dropsy. (3) The breasts in a female case showed enlargement, with hard nodules of haemorrhagic appearance. (4) In the heart, separation of the muscular fibres by dilated capillaries is the important feature. There is no degeneration of the cardiac muscle. (5) The bronchi show similar capillary dilatation. (6) Glaucoma is not to be explained by a disturbance at the sclero-corneal junction. Capillary dilatation of the ciliary body is present and may cause excessive production of fluid in the anterior chamber. There is also an angiomatous change in the subchoroidal connective tissue. (7) Marked capillary dilatation is found in the uterus and ovaries. (8) The nervous system does not show much change. There is a moderate vascular dilatation in the spinal cord but considerable in the connective tissue of the peripheral nerves.

In reply to various questions Dr. DE described the changes in the alimentary tract. There is nothing abnormal in the tongue, oesophagus, stomach or small intestines, but the large intestine shows enormous dilatation of the vessels. In one case the suprarenal glands were infiltrated with leucocytes. *A. D. B.*

ACTON (H. W.). The Classification and Grading of Different Qualities of Indian Rices in Connection with the Epidemic Dropsy Problem.—*Indian Med. Gaz.* 1932. Nov. Vol. 67. No. 11. pp. 640–641.

CUBONI (E.). Attività antiberiberica di estratti vegetali contenenti taluni enzimi (fosfatasi).—*Boll. Istituto Sieroterap. Milanese.* 1933. Apr. Vol. 12. No. 4. pp. 253–270. With 2 graphs & 2 plates. German summary (6 lines).

PELLAGRA.

NAUCK (E. G.). Beitrag zur Pathologie und Epidemiologie der Pellagra (nach Beobachtungen aus Transkaukasien). [**Pathology and Epidemiology of Pellagra in Transcaucasia.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Vol. 37. No. 2. pp. 85–124 (5–44). With 15 figs. [8 pages of refs.]

An epidemiological, clinical and pathological study of Pellagra in Transcaucasia.

The first case of pellagra in Transcaucasia was described in 1888. Following this isolated cases occurred until 1929 when a very severe epidemic broke out in West Georgia. Out of a population of about 1,300,000 in this district there were 30–50 thousand cases in 1929. The maximum incidence was in the age period 20–45 years and the ratio of women : men was 3 : 1. Similar figures regarding age and sex incidence were recorded in 1931.

The diet of West Georgia since 1929, as compared with that of neighbouring republics where pellagra is relatively infrequent, had maize as its staple article, while meat and vegetables were rarely eaten. In addition, the years 1927–1929 experienced unusually bad harvests and thus general nutrition was lowered still further and animal food became even more scarce. For example, 40·9 per cent. of the population had meat less than once a month, 25·9 per cent. once a month, 31·3 per cent. 2–4 times a month, and only 1·9 per cent. more than five times a month. In East Georgia, where wheat bread is the staple diet, pellagra is rare. From these observations it is clear that the disease is due to diet deficiency, but whether this is in respect of vitamins or protein cannot yet be determined. A constitutional factor must also be present to account for the comparative rarity of the disease in several members of the same family all living under exactly similar conditions.

The clinical findings in West Georgia do not differ from those in other parts of the world. Mention may be made, however, of associated endocrine disturbances, more especially of the pituitary gland, which is apparently responsible for a diabetes insipidus syndrome (ROSSULEW states that in Middle Asia 25 per cent. of pellagrins show this syndrome). The endocrine system, too, presents important pathological appearances. The suprarenal glands show atrophy, capillary haemorrhages, cellular infiltration, pigmentation, fatty degeneration and even necrosis. In the thyroid is found an increase in interstitial connective tissue and a round-celled infiltration. It is doubtful whether these changes are primary or secondary and, the same may be said of many of the pathological findings in other systems. *A. D. Bigland.*

STIEBELING (Hazel K.) & MUNSELL (Hazel E.). **Food Supply and Pellagra Incidence in 73 South Carolina Farm Families.**—*U.S. Dept. of Agric. Wash. Technical Bull. No. 333.* 1932. Oct. 36 pp. [23 refs.]

Satisfactory results in pellagra prevention in a farming community were obtained by supplying definite amounts of food substances of known P.P. value.

The food supply of 73 farm families in Lee County, South Carolina, was studied in connexion with pellagra incidence. Breadstuffs, sweets and fats were the main constituents of the diet in families affected with the disease in the late spring. This diet was deficient in protein, calcium, iron, vitamins A and C, and P.P. factor. Families not affected had a more abundant diet.

Definite quantities of pellagra-preventing foods were given to 44 families whose condition rendered them liable to disease in the late spring. Results showed that "the addition of 2 to 4 ounces of dry skim milk or 1 pound of evaporated milk, or 1 to 2 ounces of wheat germ, or 1½ pints of canned tomatoes, or one-half pound of cured lean pork, or 1 ounce of pure dry yeast per person per day to the food supply customarily used in winter and early spring suffices to reduce greatly the incidence of pellagra among families which in time of stress subsist on a very monotonous and one-sided diet containing very little milk, lean meat, fish or eggs." *A. D. B.*

WHEELER (G. A.). **The Pellagra-Preventive Value of Autoclaved Dried Yeast, Canned Flaked Haddock, and Canned Green Peas.**—*Public Health Rep.* 1933. Jan. 20. Vol. 48. No. 3. pp. 67–77. [11 refs.]

Dried autoclaved baker's yeast is a good source of P.P. factor; canned flaked haddock is relatively poor in this respect; while canned green peas provide a useful supply of the factor, especially in spring when other supplements are scarce.

The investigations were carried out upon human subjects in the Milledgeville State Hospital. "The substances under test were used as supplements to a basic diet designed to meet all known physiological requirements with the exception that it is deficient in the pellagra-preventive vitamin. When used alone this basic diet leads to the production of pellagra within from three to six months." Sixteen coloured females in the canned haddock test within a period of 2½–6 months showed among other symptoms to a greater or less degree, stomatitis, erosions round the mouth, seborrhoea about the nose, conjunctivitis or ophthalmia and in 2 cases unsteady gait. These "more chronic larval manifestations" of pellagra are compared with similar findings in GOLDBERGER and TANNER'S casein diet experiments and in STANNUS' pellagra cases in Zomba Central Prison, Nyasaland. It is possible that such symptoms result from a "sub-marginal" or borderline supply of P.P. factor. When a large supply of canned haddock is given pellagra is entirely prevented. *A. D. B.*

THANNHAUSER (S. J.). Pellagra und endokrine Störungen. [**Pellagra and Endocrine Disturbances.**]—*Muench. Med. Woch.* 1933. Feb. 24. Vol. 80. No. 8. pp. 291–296. With 6 figs. & 1 coloured plate.

ASCHOFF (L.). Pathologisch-anatomische Bemerkungen zu dem vorausgehenden Aufsatz.—*Ibid.* p. 296.

An account of endocrine disturbances occurring in cases of pellagra.

Thannhauser describes a new set of symptoms occurring in pellagra. He gives the name of "Freiburger Symptomenkomplex" to this condition since the cases were observed by him in the University Clinic of Freiburg, in Germany. Three patients are described in detail, both as regards their previous history and clinical findings. There seems to be no doubt that they were suffering from true pellagra. In addition they all presented the following symptom complex:—(1) Generalized chloasma-like pigmentation of a dirty brown colour. (2) Pronounced general hirsutism of a lanugo type. (3) Asthenia. (4)

Calcium deficiency in bones, with a tendency to spontaneous fracture and osteophytic outgrowths on the phalanges and metacarpals. It seems that this symptom complex developed secondarily to the pellagra which had existed for some time previously, but the question of the possibility of a primary suprarenal or pituitary disturbance with secondary pellagra owing to anorexia is discussed. One of the patients died as a result of suicide and an autopsy was performed by Dr. Aschoff. In the endocrine system the pituitary gland was found to be small and there was a " cystotoxic " atrophy of the suprarenal cortex. Two of the patients received treatment with yeast and pituitary extracts. Apparently the pellagra symptoms were relieved but not the endocrine disturbance.

Aschoff commenting upon the foregoing, describes 5 cases of his own observed during the war at Bucharest. The endocrine changes found were (1) diminution in the size of the pituitary gland and considerable decrease in the basophil cells. (2) Atrophy of suprarenal cortex and disappearance of lipoid substances. It is difficult to say whether these suprarenal changes are toxic or the result of premature ageing. It may be asked whether the pigmentation in pellagra is associated with suprarenal disease. Histological preparations show, in contradistinction to Addison's disease, no increase in melanin and therefore it seems probable that the answer to the above question is in the negative. Nevertheless, it is urged that changes in the endocrine system in pellagra are worthy of further study. *A. D. B.*

TURNER (Roy H.). With the Technical Assistance of Ercelle SHELTON. **Erythrocytes in Pellagra.**—*Amer. Jl. Med. Sci.* 1933. Mar. Vol. 185. No. 3. pp. 381–391. With 3 figs. [11 refs.]

An account of the number, size and haemoglobin content of the red blood cells in pellagra.

Blood samples were taken from 50 pellagrins—39 coloured females, 7 white females and 4 white males. 21 medical students were used as controls. Of the pellagrins 56 per cent. showed no anaemia ; 16 per cent. slight or questionable anaemia ; 12 per cent. moderate anaemia ; 4 per cent. extremely severe anaemia. Of 15 fatal cases, 10 showed no anaemia, 2 moderate and 3 severe anaemia. It may be mentioned that 5 of the 8 severe anaemia cases had other conditions which might have contributed to that state. The size of the erythrocytes was, with one exception, normal or less than normal ; that is, the anaemia when present was never of the macrocytic type. 66 per cent. of the patients had a corpuscular haemoglobin concentration within normal limits and 34 per cent. were below normal. Of 24 patients with a varying degree of anaemia 10 had a normal haemoglobin content in the corpuscles and 14 below normal. The patients who suffered from diarrhoea did not appear to be more anaemic than others and the influence of dehydration in obscuring anaemia is discussed. The importance of the blood picture in pellagra, as distinguishing this disease from pernicious anaemia or sprue, is emphasized. *A. D. B.*

FLINKER (Robert). Das Blutbild bei Pellagra. [**The Blood Picture in Pellagra.**]—*Folia Haematologica.* 1933. Vol. 49. No. 1/2. pp. 148–155.

The author examined the blood of 20 pellagra patients at Czernowitz, Rumania, in the summer of 1932. He tabulates the results, separating the early cases from those of long standing. His findings are briefly these:—The leukocytes were just above normal without change in the Arneth index. The monocyte count was low. Eosinophilia was unusual. In cases of long duration there was considerable lymphocytosis. The count and appearance of the red cells were normal; the sedimentation rate was increased. *A. G. B.*

SHERMAN (H. C.) & DERBIGNY (I. A.). **Studies on Vitamin G (B_2) with Special Reference to Protein Intake.**—*Jl. Biol. Chem.* 1932. Dec. Vol. 99. No. 1. pp. 165–171.

The finding that animals on a low protein diet are more affected by vitamin B_2 shortage than those more liberally fed suggests that there is more than one nutritional factor in the etiology of pellagra.

The authors summarize their work as follows:—

"Experimental animals which receive diets of liberal protein content (12 or 18 per cent.) were less severely affected by shortage of vitamin G (B2) than were the strictly comparable animals which received protein of the same kind at a much lower level (6 per cent. of the diet), even though the protein was of excellent nutritive value.

"In so far as the symptoms of shortage of vitamin G are regarded as pellagra-like, such vitamin theory of the disease should not preclude recognition of the possibility that the protein supply may also have a significant bearing upon the pellagra problem.

"And in so far as the pellagra problem is to be regarded as nutritional, one should think not in terms of a choice between 'protein theory' and 'vitamin theory,' but rather of a theory broad enough to take account of the possible participation of more than one nutritional factor." *A. D. B.*

RAMSDELL (Robert L.) & MAGNESS (William H.). **Parenteral Liver Extract Therapy in the Treatment of Pellagra. A Preliminary Report.**—*Amer. Jl. Med. Sci.* 1933. Apr. Vol. 185. No. 4. pp. 568–573. [10 refs.]

Cases of pellagra treated with intramuscular injections of liver extract show marked improvement.

The authors summarize their work as follows:—

"1. Twenty-two unselected cases of pellagra were treated with liver extract intramuscularly without a death and with rapid marked clinical improvement. We believe that severe cases in either young or old people, which often prove fatal in a short time, can be treated successfully with liver extract.

"2. In patients with severe mental depression or marked gastrointestinal disturbances who refuse to eat, this method of treatment will give quicker results than dietary treatment.

"3. It is simple and much easier to carry out than dietary treatment.

"4. A combination of liver extract and the usual dietary treatment will probably give better results than either alone.

"5. The time of hospitalization is greatly reduced." *A. D. B.*

SPIES (T. D.). **Intravenous Administration of Wheat Germ to Patients with Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1933. Apr. Vol. 30. No. 7. pp. 850–851.

GOLDBERGER and others have shown that wheat germ possesses curative properties when given orally to pellagrins. Many such patients are unable to ingest nutritious food or to retain it after ingestion. A trial of parenteral administration was therefore made, a 10 per cent. solution of wheat germ in normal saline being given first to animals and non-pellagrous patients and then to pellagrins. After 6 pellagrins on a restricted diet had shown benefit from the injections, 4 with severe vomiting who were denied food received them. The stomatitis improved and food was desired, so the experiments ceased. All the patients recovered. No claims are made for the efficacy of this treatment and it is recognized that other factors may have accounted for the improvement. *A. G. B.*

Spies (Tom Douglas). **Pellagra : Improvement while taking So-called " Pellagra-producing " Diet.**—*Amer. Jl. Med. Sci.* 1932. Dec. Vol. 184. No. 6. pp. 837–845. With 2 figs.

Five cases are described in which the skin manifestations of pellagra improved strikingly upon a diet believed to be lower in protein and vitamins C, D and G than so-called pellagra-producing diets. The possible presence of a secondary factor in the causation of the disease, analogous to the gastric defect in pernicious anaemia, is suggested.

The patients in this experiment consisted of 4 white males and 2 negresses. All had typical pellagra. " Each patient received a daily diet of 2,300 calories (carbohydrate 1,700 ; protein 110 ; fat 490) consisting of cornmeal mush, cornmeal muffins, pork fat, maple syrup, polished rice, cornstarch pudding, coffee and sugar." This diet is more restricted than that causing pellagra in Goldberger's original experiment. In case 1 all signs and symptoms disappeared during the first 2 weeks. In case 2 by the end of the 5th week the skin was smooth and shiny and mucous membranes of mouth and vagina had become normal. She remained 8 weeks on the diet. Case 3 continued 37 days on the diet and during the second week the dermatitis and mucous membrane lesions disappeared. Case 4 showed rapid improvement in skin lesions. The total period of diet was 20 days. Case 4 showed rapid improvement in skin lesions The total period of diet was 20 days. Case 5 after 2 weeks improvement suddenly relapsed and was eventually cured by feeding through a duodenal tube with a diet rich in vitamins and proteins. In case 6 within 12 days the skin was normal but the sore tongue progressed. At the end of 3 weeks a high caloric diet was substituted and the tongue rapidly returned to normal. *A. D. B.*

Barrada (Yousif). Clinical Aspects of Pellagra.—*Jl Egyptian Med Assoc.* 1932. Sept. Vol. 15. No. 9 pp 609–618. With 2 figs. [11 refs.]

Fakhry (Asaad). Treatment of Pellagra.—*Jl. Egyptian Med. Assoc.* 1932. Sept. Vol. 15 No. 9. pp. 619–624

Massa (Mario). Sensibilizzazione alla luce e porfirine nei riguardi di affezioni etiopatogeneticamente oscuri (pellagra, delirio acuto) Nota preliminare. —*Riforma Med.* 1932. Oct 29 Vol. 48 No. 44. pp. 1669–70, 1673. [15 refs.]

Sabry (Ibrahim). Ueber die chemische Natur des " Pellagratoxins " und die Entdeckung der Thiosulfatbehandlung der Pellagra.—*Dermat. Woch.* 1933. Feb 18 & 25. Vol. 96 Nos. 7 & 8. pp. 217–226 ; 265–274. With 4 figs.

White (E. Barton) & Taylor (A. L.). A Case of Pellagra.—*Jl. Mental Sci.* 1932. Oct. Vol. 78. No. 323. pp. 929–934.

LEPROSY.

British Empire Leprosy Relief Association. **Leprosy: an Economic Problem. Being the Annual Report for 1932 of the British Empire Leprosy Relief Association.**—32 pp. With 7 figs. London: 29 Dorset Square, N.W.1.

In this annual report the economic loss due to leprosy is stressed and illustrated by Dr. Rose's investigations in British Guiana, where the modern methods of prophylaxis by the effective treatment of early cases at clinics, in place of the expensive and ineffective compulsory segregation, has been introduced at a cost of about £10,000 a year. To this must be added the loss of the services of the lepers, whose lesions might have cleared up if discovered and treated early. The expenditure of the Association on supplying drugs for treatment in our overseas possessions is still increasing, and three-quarters of a million doses were supplied in 1932, and grants for additional accommodation for treating lepers were made to six colonies. An appeal of Lady Denham for a home for leper children in British Guiana is included in the report.

L. Rogers.

Leprosy Review. 1933. Apr. Vol. 4. No. 2. pp. 46–89. With 9 figs. on 4 plates & 1 sketch map. Quarterly Publication of the British Empire Leprosy Relief Association, 29 Dorset Square, London, N.W.1.

Interesting information on the leprosy problem in several countries is recorded in this number. In Ceylon the report of the superintendent of the Hendala Asylum shows the high incidence of 6·2 per mille in the Eastern province of the island, and it is stated that compulsory segregation has not reduced leprosy in Ceylon; its modification for application only to infective lepers is advocated, with clinics for outdoor treatment of early cases. As 15 per cent. of the cases are Indian immigrants they should be repatriated. He concludes that: "A suitable centre should be selected to carry out prophylactic measures along the lines suggested, thereby to demonstrate the period within which leprosy could be stamped out."

Leprosy in the Gutu Province of Southern Rhodesia is dealt with by B. Moiser, who estimates the cases at 80 or 1·6 per mille.

Anti-leprosy movements in Japan were discussed by A. Oltmans at the 1932 Shanghai Leprosy Conference. There are indications of the existence of the disease there as early as the fourth century A.D. Under the law for the Prevention of Leprosy of 1907 regional leprosaria are being erected and there are also some earlier founded institutions under the Mission to Lepers. The lepers are estimated at forty to sixty thousand, or 1 per mille population. The Government is opposed to outside clinic work for leprosy patients, although there are thousands who might be treated at comparatively small expense in out-patient clinics. Recent official figures show 14,261 registered lepers of whom 3,638 are in six government hospitals, and 682 in private ones, leaving about 10,000 untreated, while for each registered hospital case there are believed to be ten outside untreated. Still, progress is being made at a heavy cost of approximately £20 per annum per case treated in a leper hospital, not including the cost of the new buildings. The authorities do not favour paroling arrested cases for fear of relapse and owing to society not wanting to take them back. The proper care of child lepers is said to be largely neglected and only 27 are found in all the government hospitals. There are still many difficulties ahead.

L. R.

LEPROSY IN INDIA. 1933. Jan. Vol. 5. No. 1. pp. 1–53. With 6 figs. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

The following are the more interesting articles in this issue. R. H. GOHEEN reports on two leper women with trophic ulcers in whom he resected the lumbar sympathetic ganglia by a laparotomy incision with a view to removing the vaso-constriction and permitting larger blood supplies to the tissues. Temporary improvement followed, but the final results were disappointing as the ulcers reappeared at the original sites.

Dr. LOWE reports on the re-examination of 84 discharged Dichpali leprosy cases after ½ to 4 years with an average of 14 months. The percentage showing relapse was 14, but only a fraction of the total discharged cases returned. Of 42 cases bacteriologically negative on discharge only 2 relapsed, and of 42 clinically inactive, but showing a few bacilli still present, 10 relapsed. Most of the patients before discharge had shown no reaction to potassium iodide up to 240 grain doses, but 11 of the 12 relapsing cases had been submitted to this test, which is thus not a reliable one of cure. The 84 cases had been under treatment for from ½ to 9 years with an average of 2 years 8 months.

E. MUIR and S. P. CHATTERJI report favourably on the value of 3 cc. gradually increased to 10 cc. doses of mercurochrome intravenously in leprosy cases complicated by septic conditions, lepra reaction or liquefaction and breaking down of lepromata. In the Himalayan state of Bhutan leprosy is very common on account of great overcrowding with one or more families sleeping in the same room, according to Dr. J. A. MACDONALD.

Dr. J. LOWE emphasizes once more the importance of the clinical recognition of the very early bacteria-negative lesions of leprosy, and he criticizes the description in an article in a British textbook of medicine written by a specialist in which a lepra reaction is described as the commencement of the disease.

E. MUIR reports further on the technique of the now generally used intradermal method of treatment. He also criticizes the views of MOLESWORTH on racial immunity.

The report of the Mission to Lepers to August 1932 records that at the end of the previous year 6,225 lepers were resident in the Mission's 37 Indian Homes, 760 healthy children of lepers were being cared for, and 4,418 out-patients were attending their dispensaries for treatment; the latter being a comparatively recent and valuable development of their work. The expenditure was Rs.7,94,017 (approximately £60,000). Further, in 450 cases the disease had become arrested without deformity and in 337 more with deformity. *L. R.*

LEPROSY IN INDIA. 1933. Apr. Vol. 5. No. 2. pp. 55–111. With 6 figs. (1 map). Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

This issue deals among other things with the following subjects:— The treatment of trophic ulcers based on thirteen communications which summarize our information. The leprosy clinic and the control of leprosy by J. LOWE, in which the need of more preventive work of clinics is emphasized, in the form of instructing the people in avoiding contagion. Leprosy of the lungs is dealt with by E. MUIR with records of ten cases. The diagnosis is confirmed if the sputum and acid-fast organisms diminish rapidly as the lepra reaction passes off. The discovery of lepra organisms in thick blood films was found by E. B. CHRISTIAN to necessitate much searching even in advanced skin cases. in contrast to large number of bacilli found in the first field of the microscope by examination of the skin lesions in most cases.

A number of surveys and other work, mainly of local interest, are reported, with the usual result of finding many early unsuspected cases and the starting of dispensary treatment under the local authorities with the aid of local committees. For example, in the Orissa Mayurbhanja State only 78 lepers were known to the police, but after a survey 400 patients were enrolled at the clinic in the same area, in addition to 200 from beyond it. In the Kulu hill area of the Punjab a survey detected 266 cases, or the high rate of 3·36 per mille, with infection in 25 per cent. of the villages. In an area of Lower Burma 121 lepers were found among 20,480 people, or thirteen times the number previously known. *L. R.*

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION. **Annual Report of Indian Council for 1932.**—81 pp. With 19 figs.

The annual income is derived from an endowment fund which brings in £9,000 a year to cover the research work in the Calcutta School of Tropical Medicine, provincial leprosy surveys and grants to the provincial governments. A remarkable increase in the number of leprosy clinics and of the patients treated in them is shown. Thus in the large Salem district of Madras the patients attending the clinics increased from 3,776 to 10,000, and a sum of £2,000 was collected by a leper day propaganda. The total in those provinces for which the figures are recorded reach 108,000, exclusive of Madras with over 300,000 attendances (number of patients not given) so the total leper patients for all India must now be about 150,000, or half as many again as were recorded for all India in 1921, owing to the number of unrecorded early cases that have been attracted to the clinics to obtain the modern treatment. The survey party has now been dissolved after several years' valuable work. In Calcutta 59 doctors were instructed in treatment in addition to some taught at Dichpali in Western India.

L. R.

MUIR (E.) & LOWE (J.). **Leprosy Relief in India. A Review of the Present Situation, and a Suggested Policy for Provincial and Local Authorities.**—*Indian Med. Gaz.* 1933. Feb. Vol. 68. No. 2. pp. 88–92.

This paper is on the same lines as that of Dr. Lowe on Leprosy in India, Vol. 5, No. 2, noted above. It brings out well the importance of preventive as well as treatment work by leprosy clinics. The staff visit the homes of the patients and give instruction in the measures necessary to prevent new infections arising through contact with the patients, *e.g.*, by their sleeping in the same room as healthy persons especially susceptible children. *L. R.*

GUPTA (A.). **Some Observations on the Diagnosis and General Management of Leprosy.**—*Calcutta Med. Jl.* 1932. Nov. Vol. 27. No. 5. pp. 121–132. With 9 figs. on 4 plates.

The author emphasizes the importance of diagnosing the disease clinically long before nasal smears have become positive bacteriologically and he discusses the differentiation from other common skin affections. He considers that chaulmoogra therapy still occupies the foremost place, and on the whole he is " quite optimistic about the results of the treatment of leprosy," if cases are seen fairly early.

L. R.

DE MARQUEISSAC (H.) & SOHIER (H.). Enquête sur la lèpre en pays Kabré (Nord-Togo). [**Leprosy in the Kabré Country (North Togo).**] —*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 474–485. With 2 charts.

This enquiry relates to an area in North-Togo in West Africa, where 653 lepers were found among 109,061 people examined, or 0·59 per cent., but among children under 15 the rate was only 0·16 per cent.; 68 per cent. were skin, 26·3 mixed and only 5 per cent. pure nerve cases. The infant mortality of the children of lepers was only slightly above the average, and 18 per cent. of pregnancies ended in abortion. The people attribute the disease to sorcery, punishment for theft, etc.

L. R.

ROSE (F. G.). **Six Years of Leprosy Work in British Guiana.**—*Brit. Guiana Med. Ann. for 1932.* pp. 35–44.

This paper records the remarkable progress that has been made in the last few years in the campaign against leprosy in British Guiana since the modern hospital and dispensary treatment has replaced the old rigid compulsory segregation, with inevitable hiding of the early more amenable cases, as will appear from the summary of the author below. In referring to the opinions of two London writers on leprosy Dr. Rose remarks :—" It would be unfair to the millions of persons suffering from leprosy throughout the world to allow so pessimistic a pronouncement to go unchallenged."

" 1. Extended trial of certain drugs in the treatment of leprosy in British Guiana has demonstrated the superiority of hydnocarpus oil and its products

" 2. The standard method of treatment is now Alepol intravenously followed by hydnocarpus oil or esters together with such supplementary aids as trichloracetic acid, carbonic 'snow,' electrical treatment, surgery, etc.

" 3. The weight chart is used as the guide to dosage.

" 4. Of 194 early cases treated during the past six years, 168 or 86·6 per cent. have improved, and out of 63 of those who were open cases, 69·8 per cent. have become closed after treatment.

" 5. Of 297 advanced cases, 65 per cent. have improved, 64 have become arrested, and 59 quiescent.

Of 192 advanced cases originally open 31·8 per cent. have become closed after treatment.

" 6. The proportion of relapses has been 4·7 per cent.

" 7. The notification figures reveal a tendency to a decrease in the incidence of leprosy in British Guiana.

" 8. Nearly all the cases now being discharged leave without any of the stigmata of leprosy.

" 9. In spite of the large number of cases now being treated, and the additional measures instituted, the cost of upkeep of the Leprosy Hospital has decreased from $41,626·85 in 1926 to $31,136·09 in 1931." *L. R.*

LAMPE (P. H. J.). Heeft lepra neiging tot spontane stilstand in haar ontwikkeling zonder blijvend defect? **[Has Leprosy a Tendency to Spontaneous Arrest?]**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. July 19. Vol. 72. No. 15. pp. 946–952. With 1 fig. [14 refs.] English summary (7 lines).

Surinam holds a very favourable position for the study of the epidemiology of leprosy with its small population (150,000), its good medical supervision and its satisfactory methods of registration. In this article the age distribution of leprosy according to race and morbidity-index are set out. An especially interesting curve and table show the frequency distribution per thousand of lepers living at the different age periods as compared with those of the general population. The figures are: (1) lepers, 17, 125, 185, 183, 205, 130, 88, 52, 15 and (2) general population 129, 107, 107, 101, 152, 151, 109, 94, 45, 5 for the age periods, in years, 0–4, 5–9, 10–14, 15–19, 20–29, 30–39, 40–49, 50–64, 65–79 and 80+. By comparison with the general curve which descends gradually from a high point, we see here the rapid rise of the leprosy curve from zero at birth to a peak at 20 years of age, its rapid fall thereafter to 30 years of age and its parallelism from about this age onwards to the general curve. It is especially the rapid fall of the curve from its peak which requires explanation and the possibilities considered are (*a*) an incorrect diagnosis of leprosy at an early age, (*b*) that the increase of young lepers is a recent phenomenon, (*c*) less complete knowledge of older lepers, (*d*) increased risk of death of the older lepers, and (*e*) inability to recognize lepers as such with advancing age. The answer to these possibilities is given in the author's concluding English summary :—

" A study of the morbidity rates of ' manifest ' leprosy . . . leads to the hypothesis that in many cases the early symptoms of leprosy in children and young adults remain stationary or diminish ; in other words . . . that only part of the external visible leprosy-infections develop to a more advanced leprosy-suffering which in countries with endemic leprosy is known as such also by laymen." *W. F. Harvey.*

TISSEUIL (J.). Classification biologique des syndromes de la lèpre. **[Biological Classification of Stages of Leprosy.]**—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 10–12.

The author describes a primary period of the first manifestations of leprosy, a secondary with thickened papules and nodules of the skin, a tertiary period with subcutaneous fibrous nodules and ulceration, and a quarternary with sclerosis of the dermal lesions and the appearance of secondary nerve lesions. Marcel LEGER in discussing the paper disagreed with these views. *L. R.*

CONZEMIUS. L'elimination de *Mycobacterium leprae* par desquamation cutanée physiologique. (Note préliminaire.) **[Elimination of *Myco. leprae* by Desquamation of Skin.]**—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. 13. No. 1. pp. 1–3.

The author was able to confirm in one case the observation of MUIR and CHATTERJEE that light scrapings of the skin over leprous lesions not drawing blood may show numerous acid-fast bacilli, which may thus be given off by desquamation in the absence of any ulceration. A. DUBOIS in discussing this note was not satisfied that the bacilli had not been derived from the nasal discharge of the patient infecting the skin, since sections of such lesions showed few or no bacilli in the superficial epithelial layers. *L. R.*

THOMAS. Contribution à l'étude du diagnostic et du traitement de la lèpre chez le noir. [**Diagnosis and Treatment of Leprosy in the African.**]—*Bull. Méd. du Katanga.* 1932. Vol. 9. No. 6. & 1933. Vol. 10. No. 1. pp. 149, 151, 153–5; 1, 3–7.

The author records that occasional trials of bismuth, tartar emetic, mercury cyanide and gold salts had not yielded any results, and he goes on to describe the use of various preparations of chaulmoogra oil. These had no influence orally, but produced a light polynuclear increase when injected into the muscle or a vein. Of 41 cases treated only 4 showed clear improvement of the lesions, 3 died, 19 showed a certain amount of general improvement and gain in weight with ups and downs of the lesions, and 15 nerve cases remained stationary or got worse. *L. R.*

SCHWETZ (J.). A propos du traitement de la lèpre par la trypaflavine. [**Treatment of Leprosy by Trypaflavine.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. 13. No. 1. pp. 43–47.

Good results have been reported by Marcel LEGER from the use of trypaflavine in leprosy, so the drug was tried in eight nodular and macular cases and one recent case. In none of them had trypaflavine the least influence on the progress of the disease either clinically or bacteriologically. *L. R.*

DUBOIS (A.) & URY (J.). Note sur le traitement de la lèpre pas les sels d'or. [**Treatment of Leprosy by Gold Salts.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. 13. No. 1. pp. 5–11.

The authors have tried injections of solganol and solganol B, and in a few cases such other gold preparations as Chrysalbine, Allochrysine and Lopion, in cases of leprosy in the Congo area, using cutaneous cases with numerous lepra bacilli in the lesion as the best test of the specific action claimed for gold preparations. Ten cases were treated, but one died, one could not stand the drugs and in one the treatment was too short. In the other seven injections were persisted with for seven months, but in no case did improvement, either clinical or bacteriological, result and one was worse, although in three of them a total of four to five grams of the drugs were given. They therefore conclude that the treatment was valueless, but think that larger and less frequent doses might be worth trying. *L. R.*

STRACHAN (P. D.). **Chaulmoogra Oil in the Treatment of Leprosy.**—*South African Med. Jl.* 1933. Apr. 8. Vol. 7. No. 7. pp. 210–214.

The author noticed that out of 21 patients discharged with arrested leprosy 9 were classed as spontaneous arrest, including 7 early cases, and some of the others did not appear to have had adequate treatment. An analysis of the dermal and mixed cases in the Basutoland Leper Asylum showed 13·24 per cent. of arrests among 461 treated, and 3·83 among 265 cases with no treatment or under ten injections, while only 21·43 of C1 treated cases were arrested. Since 1927 alepol, which is best tolerated, and iodized esters have been used with local applications of trichloracetic acid, and in 112 cases with no or trivial treatment the arrests were 52·7 per cent., in those with inadequate treatment (less than 20 injections within six months (41·7 per cent.) and in 101 adequately treated cases 48·5 per cent., but in N1 (slight nerve cases) the figures were 61·5, 78·7 and 79·25 respectively. The majority were advanced cases, and it is suggested that early nerve cases might show different results. The importance of favourable conditions, diet, hygiene, exercise and treatment of concurrent diseases in the treatment of leprosy is emphasized. *L. R.*

LARA (C. B.) & LAGROSA (M.). **Observations bearing on the Question of Whether or Not the Chaulmoogra-Group Drugs have any Special Action in Leprosy : I. Changes in Leprotic Skin Lesions following Intradermal Injections of Various Oily. Preparations.**—*Jl. Philippine Islands Med. Assoc.* 1932. Dec. Vol. 12. No. 12. pp. 599–603.

The rôle of local tissue irritation in connexion with the improvement following injections of antileprotic drugs on one side of the body only in cases with symmetrical lesions, leaving the uninjected lesions on the other side as controls has been tested. Ethyl stearate and ethyl oleate were used, as well as iodized wightiana esters, and the two former caused more local irritation than the wightiana one. It was found that after ten months' treatment the less irritating wightiana preparation had produced more improvement than the other more irritating esters ; so the conclusion is come to that " the local inflammatory processes produced by injections of the chaulmoogra preparations are not a necessary, or even an important, factor in the improvement observed with the use of these drugs." *L. R.*

LAGROSA (Manuel). **Changes in the Anesthesia following Antileprotic Injections of Iodized Hydnocarpus Wightiana Ethyl Esters.**—*Jl. Philippine Islands Med. Assoc.* 1932. Dec. Vol. 12. No. 12. pp. 604–608.

The author describes a trial, on similar lines to those of the foregoing note, of intradermal and subcutaneous weekly injections in the purely anaesthetic areas on one side of the body only of iodized wightiana ethyl esters, in addition to routine intramuscular injections, with clinical tests every five weeks and at about six months after the last injection. He concludes that the local treatment of anaethesia in cases with no other dermal lesions has a definite value, as complete and permanent return of normal sensibility may be expected in favourable cases, and that the same principle of bringing the drug into intimate relation with the affected nerves may also prove effective in preventing neurotrophic changes. The intradermal doses appeared to be more effective than the subcutaneous ones, but subcutaneous injections are indicated along the course of an affected nerve trunk. *L. R.*

PALDROCK (A.). Der Sektionsbefund einer mit CO_2-Schnee behandelten Leprösen. [**Autopsy of a Leper treated with CO_2 Snow.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 271–276.

This is an interesting case of dermal leprosy affecting the eyebrows and ears and with two ulcers on the right arm, the lesions of which cleared up clinically and bacteriologically under carbon-dioxide snow, local applications and chaulmoogra oil internally, and later solganol injections. A relapse occurred after five years, when the snow treatment was resumed and alepol given, the latter having no effect, but the local treatment and solganol cleared up the new skin lesions. She died of gangrene of the foot after it had been chafed, and a minute microscopical examination of the tissues and internal organs showed only a few acid-fast bacilli in the epiglottis, so cure is claimed. *L. R.*

BLACK (Kenneth). **Periarterial Sympathectomy for the Ulcerations of Leprosy.**—*Malayan Med. Jl.* 1933. Mar. Vol. 8. No. 1. pp. 60–61.

Section of the sympathetic nerves was carried out in Hunter's canal in 13 lepers, in addition to two cases formerly published, for old standing perforating ulcers of the feet of from eight months to twelve years duration which had failed to respond to rest and antiseptics ; in only one was there bone necrosis. In every case complete healing took place in one to eight weeks, but in six of the thirteen relapses occurred, usually due to the patients' fault. One soon healed again with rest in bed, and in the eight ultimately successful cases the ulcers have remained healed for from four to fifteen months. Complete rest in bed for two weeks after healing is essential to success. *L. R.*

ADANT (M.). Quelques recherches sur la lèpre. [**Researches on Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 411–427. [30 refs.]

Attempts to cultivate the lepra bacillus in the media of Löwenstein and of Sonnenschein, and modifications of them, were completely negative. Inoculations of Cercopithicus and Cynocephalus monkeys, with and without splenectomy, with lepra bacilli also failed. He has also studied the seró-diagnostic methods of MATEFY, BOTELHO and of RUBINO, and found that the last two gave results of interest, and he considers that Rubino's reaction is the more specific one, since by absorption methods 'heteroagglutination is avoided. Moreover, Bargehr's cutaneous reaction with leprolin gave negative results in advanced lepers and in their contacts and in children who were free from leprosy. *L. R.*

WATANABE (Yoshimasa) & HARAZAWA (Jinsai). **Pure Cultivation and the Animal Experiments of Acid-Fast Bacilli from the Blood of the Leprous Patients.**—*Kitasato Arch. Experim. Med.* 1933. Apr. Vol. 10. No. 2. pp. 87–98.

These workers made cultures of the blood of lepers by Löwenstein's method, somewhat modified and including Japanese carrot extract, and obtained two kinds of acid-fast bacilli in 8·6 per cent. of their trials, most frequently from the leucocytes and sediment of the blood.

This proportion was much less than they got by cultures of nodules which gave 40 per cent. of positive results. They were unable to infect mice or rats and are doubtful whether their cultures are those of the lepra bacillus. *L. R.*

LÉPINE (P.), MARKIANOS (J.) & PAPAYOANNOU (A.). Sur l'hémoculture du bacille de Hansen par la méthode de Löwenstein. **[Culture of Leprosy Bacillus by Löwenstein's Method.]**—*C. R. Soc. Biol.* 1933. Mar. 10. Vol. 112. No. 9. pp. 845–846.

The authors record only negative results from the use of Löwenstein's method of haemoculture of the lepra bacillus. *L. R.*

MCKINLEY (Earl B.) & VERDER (Elizabeth). **Cultivation of** *Mycobacterium leprae.*—*Proc. Soc. Experim. Biol. & Med.* 1933. Feb. Vol. 30. No. 5. pp. 659–661.

These workers have continued the investigation of SOULE and MCKINLEY [*ante*, p. 238] which had enabled them to carry their non-chromogenic acid-fast bacillus obtained from cases of leprosy through eight and sixteen generations respectively, and to produce suggestive lesions in two monkeys. After eighteen months only two colonies were obtained, and one of these was planted out in embryonic tissue made from minced chick embryo 7 to 11 days old washed and suspended in Tyrode's solution ; this proved more successful than human embryonic tissue, which was also tried. Growth was stimulated and obtained in five days under CO_2 and O tension and under ordinary atmospheric conditions, and they are now able to cultivate the strain on young chick embryo tissue medium apparently indefinitely since it has remained viable for two years. They have also obtained cultures in their new medium direct from nodules from three different cases of leprosy after treating the emulsions with 3 per cent. sodium hydroxide to destroy contaminating organisms, so they believe that cultures of Hansen's bacillus of leprosy can now be readily obtained. *L. R.*

OTSUKA (Hiroshi). **On the Sedimentation Phenomena of Red Blood-Cells and the Amount of Total Nitrogen, Non-Protein Nitrogen, Fibrin Nitrogen and Sugar in the Blood of Lepers.**—*Japanese Jl. Dermat. & Urol.* 1933. Feb. Vol. 33. No. 2. [In Japanese pp. 127–169. With 12 charts. [46 refs.] English summary pp. 15–34. With 10 charts.]

This paper records a good deal of work which is well summarized in the following conclusions of the author.

" 1. I determined the sedimentation velocity and type, total nitrogen, non-protein nitrogen in blood, fibrin nitrogen in plasm, blood sugar in the fasting state in the morning and at noon time, and followed the changes in blood sugar for two hours after the ingestion of glucose or the administration of adrenalin chloride on out-patient lepers of our dermatological department.

" 2. The sedimentation velocity is higher than normal in 51·9 per cent. of the cases examined and it increases in the order of the nervous, maculous mixed and tuberculous types. There is a parallelism between the sedimentation velocity and the grade, condition of the affections and the lepra reaction, and no relation between it and the sex, the age and the duration of disease. In cases in which the condition becomes improved or arrested by the treatment, the sedimentation velocity is greater than in progressive cases without treatment.

" 3. In 5 per cent. of the lepers examined the sedimentation velocity is much less than normal or the relation between the velocity and the type of sedimentation varies from that of normal, tuberculosis and of urogenital diseases.

" 4. The total nitrogen of blood in leprosy is normal for the nervous type and decreases in order of the maculous, mixed and tuberculous type. There is a relation between the amount of the total nitrogen and the condition of affection and the sedimentation velocity, and it seems that the grade and treatment have no influence upon the total nitrogen.

" 5. The non-protein nitrogen in blood increases in order of the mixed, tuberculous, nervous and maculous type, though it is under 40 mg./dl. except in two cases. It increases in proportion to the grade, the condition and the albumen test in urine, and it has no relation to the sedimentation velocity and the lepra reaction by *Toyama-Miyoshi*.

" 6. The fibrin nitrogen in plasm increases in order of the nervous, maculous, mixed and tuberculous type, and in proportion to the grade, the condition of affection and the sedimentation velocity of the red blood-cells. The value of fibrin nitrogen rises higher with treatment and there is no relation between it and the *Toyama-Miyoshi's* lepra reaction.

" 7. The blood sugar in the fasting state in the morning is less than 120 mg. per cent. without exception and increases 4·5 per cent. in amount from the normal, and there is no change in value for the types.

" 8. The blood sugar in the fasting state at noon time increases as much as 10·5 per cent. in amount from the normal and there are 12 per cent. of cases on which the sugar is more than 120 mg. per cent. The rate of increase diminishes in order of the nervous, maculous, mixed and tuberculous types. It is inversely proportional to the grade and the condition of affection and directly proportional to the sedimentation velocity. The sugar test in urine was negative in all of the subjects examined. There is no relation between the blood sugar and the positive albumen test in urine. The treated lepers have much more blood sugar than the cases without treatment.

" 9. The alimentary glycemia caused by the ingestion of 100 gr. of glucose by the mouth rises not so high as the normal, and the return to the normal value is not markedly disturbed in cases of light affection, in cases in an arrested state or in chronic progressive state and in cases with treatment. In cases of heavy affection and in acute progressive cases without treatment, the rate of increase in blood sugar is greater and it needs more time to reach the maximum value and subsequent return to the normal value is delayed, so that the higher value of blood sugar continues for a longer duration than the normal.

" 10. Though the adrenalin hyperglycemia changes a little from the normal on the whole, there are cases in which the hyperglycemia rises much higher or is remarkably lower than the normal. In cases of heavy affection, in cases of improved or arrested condition and in treated cases, the restrained phenomena of adrenalin hyperglycemia take place more frequently than in other cases." *L. R.*

CHIYUTO (Sulpicio). **Is the Histamine Test Valuable in the Diagnosis of Early Leprotic Macules.**—*Monthly Bull. Philippine Health Serv.* 1932. Nov. Vol. 12. No. 11. pp. 628–632.

Thirty-four histamine tests were made in leprotic nodules of 30 patients, and 14 with tuberculoid changes histologically were all positive, but of 20 lesions showing histologically perivascular infiltrations 3 only were positive and 17 negative, and the former only showed anaesthesia. The test is therefore not dependable in the early stages when only perivascular infiltration is present without neurological changes. *L. R.*

MONTAÑES (P.). Vorläufige Mitteilung ueber eine Intracutanreaktion zur Lepradiagnose. [**An Intracutaneous Reaction for the Diagnosis of Leprosy.**]—*Arch. f. Dermat. u. Syph.* 1933. Mar. 2. Vol. 167. No. 3. pp. 578–584.

The author prepared a leprolin for intracutaneous diagnostic purposes by treating ground up unulcerated lepromata with 10 per cent. caustic potash solution at 37°C., filtering through glasswool and centrifuging to separate the acid-fast bacilli. The sediment of 20 grams of the original leprous material in 200 cc. physiological salt solution, 0·9 per cent., with 0·5 per cent. carbolic acid, was used in 0·2 cc. doses for intracutaneous injections into the healthy skin in front of the elbow. Control injections were made with similar preparations of the grass bacillus, Ducrey's bacillus and extracts of lupus tissue. An unimportant traumatic reaction results in 24 hours and disappears in 2 to 3 days. Later a positive reaction is shown by a small hard infiltration the size of a lentil, appearing in 6 to 8 days, enlarging and lasting for 15 to 30 days and disappearing in 5 to 6 months. In 119 lepers 99 were negative and 17, or 13·91, definitely positive, the rest being doubtful. Only 3·7 per cent. of cases of 0 to 10 years duration were positive, and 4·85 per cent. of bacteriologically positive cases, against 75 per cent. negative to bacilli, and 100 per cent. of definitely progressive forms were negative while the controls were positive. The method appears to be promising, and it is being compared with Bargehr's method. *L. R.*

TISSEUIL (J.). Contribution à l'étude des réactions cutanées dans la lèpre : dissociation des réactions dermique et sous-cutanée dans un cas de lèpre tuberculoide. [**Skin Reactions in Leprosy.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 576–579.

The author has investigated the reactions in two tuberculoid lepers after the injection of sterile emulsions of human lepromata. The injections were made into the intermediate zone and the peripheral border of the lesion, and into the healthy skin. Reactions were provoked after a few hours in both the tuberculoid lesions and in the healthy skin, and in one case an abscess formed 15 days later following an inflammatory condition. Subcutaneous injections at the edge of a nodule formed an abscess in the patient with only two skin leprous lesions, but produced no reaction in the other patient with very extensive tuberculoid lesions. *L. R.*

TISSEUIL (J.). Nouvelle série de traitement de la lèpre du rat. [**Treatment of Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 579–584.

In the series now reported the rat-leprosy bacillus containing material was injected subcutaneously, instead of intraperitoneally, so that the slowly developing lesions could be watched. Treatment was commenced after 1 or 2 months when small nodules were appearing in the skin some of which later ulcerated. Among the preparations tried in treatment were extracts of lepromes in acetone or methyl alcohol, the former of which had only a temporary good effect, while the latter accelerated the evolution of the nodules. Chaulmoogra esters with 5 per cent. creosote had a beneficial general effect and retarded the progress of the disease. A chaulmoograte of gold guaiacol, supplied by Professor DÉLÉPINE, appeared to slow the progress during the first month, but later it was more advanced than in controls. Molybdate of ammonium had a definitely beneficial effect, with less thickening of the lesions and delayed ulceration and more rapid healing and maintenance of the general condition. *L. R.*

MARCHOUX (E.) & CHORINE (V.). Résistance du bacille de la lèpre du rat aux acides et aux alcalis. [**Resistance of the Rat Leprosy Bacillus to Acids and Alkalis.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1025–1026.

As rat leprosy can readily be produced by inoculation of the material containing it the effects of disinfectants on its vitality can be tested. The experiments here recorded show that the organisms treated with 5 per cent. sulphuric acid or 15 per cent. antiformin did not lose their vitality. *L. R.*

VIALARD, VERLIAC & BERGE. Sur un cas de lèpre mixte à incubation prolongée. [**Case of Mixed Leprosy of Long Incubation.**]—*Bull. et Mém. Soc. Méd. Hôpit de Paris.* 1933. Apr. 3. 49th Year. 3rd Ser. No. 11. pp. 411–414.

A case is described of leprosy in a girl of 21 in which the nerve symptoms appeared over eleven years after her return to France from New Caledonia. *L. R.*

MANALANG (C.). **Significance of Pathologic Findings in Biopsy Materials from Lepers, III.**—*Monthly Bull. Philippine Health Serv.* 1932. Oct. Vol. 12. No. 10. pp. 541–550. [23 refs.]

——. **Significance of Pathologic Findings in Biopsy Materials from Lepers, IV.**—*Ibid.* pp. 551–554.

These are two further brief notes in support of the author's remarkable suggestion that the *Myco. leprae* is not the cause of the disease, but "leprosy must be due to the activity of a virus stage of *M. leprae*, and not the bacilli," because the bacillus is scanty in the tuberculoid cases. *L. R.*

ARAUJO (H. C. de Souza). Haverá uma fórma filtrante do Mycobacterium leprae?—*Brasil-Medico.* 1933. Feb. 4. Vol. 47. No. 5. pp. 80–82.

BENCHETRIT (A.). El primer centenar de enfermos de lepra curados.—pp. viii + 145. With numerous illustrations. 1933. Bogota: Editorial Minerva.

PEZZI (Giuseppe). Tentativi di terapia della lebbra anestetica con iniezioni endovenose di autoliquor. (Osservazioni cliniche e ricerche di Laboratorio.)—*Ann. di Med. Nav. e. Colon.* 1933. Mar.–Apr. 39th Year. Vol. 1. No. 3–4. pp. 183–186.

SMIDT (H. N.). Röntgenbehandeling van lepra.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Dec. 6. Vol. 72. No. 25. pp. 1690–1704.

MISCELLANEOUS.

QUARTERLY BULLETIN, HEALTH ORGANISATION, LEAGUE OF NATIONS. Geneva. 1933. Mar. Vol. 2. No. 1. pp. 3–115. With 2 maps. —**The Cape Town Conference. Report of the International Conference of Representatives of the Health Services of Certain African Territories and British India, held at Cape Town, November 15th to 25th, 1932.**

The Cape Town Conference was called by the Health Section of the League of Nations at the instance of the Union Health Department of South Africa. Sir George BUCHANAN represented the Health Committee and was appointed Chairman, and Dr. C. L. PARK, Director of the Eastern Bureau at Singapore, was General Secretary. The countries represented were British and Portuguese, namely Basutoland, Bechuanaland and Swaziland, Kenya, Gold Coast, Nigeria, Northern and Southern Rhodesia, South West Africa, Tanganyika, Uganda, Zanzibar, British India, Angola, Mozambique and the Union of S. Africa. The Rockefeller Foundation was also represented.

The subjects considered were yellow fever, plague, smallpox, leprosy, rural hygiene, dengue, transmission by aircraft of diseases other than yellow fever; about half the report is concerned with yellow fever and plague.

Yellow Fever.—The possibilities of extension of yellow fever to regions of Africa now unaffected formed the chief concern of the Conference, and especially with regard to aircraft, and this is emphasized by the inclusion of a map of Africa indicating the air routes, present and in contemplation, British, French, Belgian, Portuguese, Italian and Dutch (the last two in the North of Africa only). Either the human or mosquito carrier may be conveyed by aircraft and precautions must be taken against both risks.

Yellow fever must be regarded as endemic over a large section of Western Africa and it is noted that its occurrence in a place where it was not previously known may often be explained not by the introduction of infection but by the introduction of susceptibles. Precision in the matter of its distribution may now be obtained by mouse protection tests working outwards from known endemic areas. After giving careful consideration to the terms of the International Sanitary Convention for Aerial Navigation, 1932, the Conference was convinced "that the immediate acceptance of the principles therein formulated will not only form an invaluable safeguard against the spread of yellow fever to other countries when air travel routes are established, but is needed in advance of their establishment so that the conditions required for security will be known when these routes are being planned." Experience of modern methods of control encourages the belief that should yellow fever enter regions in Africa hitherto free it is capable of control and limitation in a way which would be quite impossible with influenza or even malaria.

The additional safeguard of vaccination should be adopted where it is practicable.

India and the Dutch East Indies have prohibited absolutely importation of yellow fever virus for laboratory purposes; the Conference hesitated to make a similar recommendation to African countries so far free from the disease; any legislative or administrative restriction should, they think, be qualified by the reservation that the conditional admission of the virus may be authorized when diagnostic tests or preparation of vaccine are urgently called for; the virus used for mouse protection tests has so far shown itself incapable of reproducing yellow fever in man or monkey.

The Report goes on to consider the principles of the International Sanitary Convention for Aerial Navigation, 1932, and the measures applied or projected for Aëdes and yellow fever control. The Delegate of the Government of India, General GRAHAM, said that his government considered that in the light of available information "prohibition of air traffic from yellow fever areas to susceptible areas [such as Indian ports] was the only reliable safeguard."

The conclusions of the Report are as follows:—

"1. None of the fundamental observations upon which public health control of yellow fever is based have been disturbed by recent knowledge. Although under exceptional conditions the incubation period in man may be protracted or the infectivity period may be prolonged, and although experimentally a wider range of dispersal of the mosquito vector has been shown to be possible, yet, for practical purposes, public health control of yellow fever can be based upon the observations that yellow fever is transmitted from actual human cases only in the first three days of the attack, that the incubation period of new cases does not exceed six days, that the agent of transmission is a domestic mosquito which remains in, or in the immediate vicinity of, the house where it has fed, and that the insect, after feeding upon an infected case, must survive for twelve days before it can transmit the virus to another person.

"2. The mouse-brain virus protection test may be accepted as specific for yellow fever.

"3. Large areas in the countries of central, eastern and southern Africa, believed at present to be free from yellow fever infection, must be regarded as infectible.

"4. It is of obvious importance that immediate action be taken to ascertain the position with respect to the presence of the disease, unsuspected, in endemic form, and also to the susceptibility of the population to the disease, in those African countries in which yellow fever has so far been unknown. In these enquiries, the Government of the Anglo-Egyptian Sudan, not represented at this Conference, should be invited to participate. It is satisfactory to record that action recommended in this section is already envisaged in French Equatorial Africa, as well as in Angola; that protection test surveys have already been commenced in the Belgian Congo, and that arrangements are now in progress for similar surveys to be carried out in the Union of South Africa, Bechuanaland Protectorate, South West Africa, Mosambique, Southern Rhodesia, Northern Rhodesia, Tanganyika, Kenya, Uganda and Zanzibar.

"5. Steps should be taken for the provision of equipment and for the training of staff at laboratories in Africa, appropriately selected and situated, where necessary yellow fever work can be carried out after the termination of the detailed work covering many parts of Africa, which is now being undertaken by the Rockefeller Foundation. Such work would include the performance of protection tests and of protective vaccination.

"6. For the purposes of paragraphs 4 and 5 above, the importation of fixed mouse-brain yellow fever virus should be permitted in laboratories in Africa, under Government authority and control.

"7. The co-operation of the Rockefeller Foundation in the establishment of laboratories for yellow fever control advocated in paragraphs 4, 5 and 6 above, in the manner suggested by Dr. Sawyer, is particularly welcome.

"8. The action taken by the British Government in providing facilities in England for protective vaccination against yellow fever deserves attention, and it is hoped that other administrations concerned with public health work in Africa will provide similar facilities at those laboratories where yellow fever work is being carried out or is being projected.

" 9. The risk that infection with yellow fever from west to east may spread from village to village by the opening up of new trade and motor routes should be taken into account. It is hoped that the present position along such routes may be determined by protection test surveys of the population, and that the position thereafter may be reviewed from time to time by re-surveys. This slow method of spread of the disease may ultimately prove more capable of breaking down our defences than the more rapid spread which can result directly from modern fast means of transport. In this connection it is suggested that the excellent motor routes which now exist from the French Cameroons across French Equatorial Africa and the northern section of the Belgian Congo need to be considered in connection with risk of infection to the Anglo-Egyptian Sudan and to Uganda.

" 10. Although the possibility exists of transport of infected mosquitoes by air, rail or road, it is considered that the greatest risk, or at least the more difficult risk to avoid, consists of the transport of a person during the incubation period of the disease.

" 11. It is agreed that the Governments of African countries should be advised forthwith to accept and ratify the International Sanitary Convention for Aerial Navigation, 1932.

" 12. The systematic communication of new facts in regard to yellow fever in Africa to the Office International d'Hygiène Publique in Paris, for consideration by its Yellow Fever Commission, is provided for by the above Convention, and this system should be utilised as fully as possible.

" 13. Yellow fever control, as now carried out in the West African countries, is an important factor for the protection of neighbouring countries from yellow fever infection, and it is important that these measures should be continued and their efficiency augmented. Special stress is laid upon the provision of pipe-borne water supplies, active destruction of Aëdes in towns and villages, and the segregation of the non-indigenous population in residential areas in which effective Aëdes control can be maintained.

" 14. The Health Departments of African countries believed at present to be free from yellow fever infection should obtain more information concerning Aëdes infestation than is now available, and should introduce, or make more effective, measures for the control of Aëdes in those centres at which risk of introduction of yellow fever infection is specially to be apprehended."

Annexed are four papers, by SAWYER of the International Health Division on the yellow fever problem as it relates to Africa, by DUFF and Damas MORA on yellow fever control in the Gold Coast and Angola, and by R. R. SCOTT on the yellow fever problem as it affects Tanganyika Territory; MORA stated that there has been no yellow fever in Angola since 1899.

Plague.—In the report on plague the conditions in the Union of South Africa are contrasted with those in East Africa: in the former the disease prevails among wild rodents, in the latter among domestic rodents. Infection is widespread over the Union and extends across Bechuanaland into South West Africa and southern Angola. Invasion of Southern and Northern Rhodesia and of Portuguese East Africa is thought by the delegates of those countries to be possible or even probable. The connecting link between the wild rodents, chiefly gerbilles (*Tatera lobengulae*) and man is the multimammate mouse (*Mus coucha*) which in the Cape area is replaced by the striped mouse (*Rhabdomys pumilio*). The urban areas with few exceptions and all the ports have been free for 17 years. In the Union every precaution is taken to prevent conveyance of plague overseas in exported maize.

More detail of the position of plague in the Union and in South West Africa is given in an annexure by Sir E. N. THORNTON. He shows that certain fleas of veld rodents known to be potential plague vectors can survive without hosts easily for 2 months and sometimes for 3 or even 4 and are then capable of reinfecting with plague. (See Appendix.)

Other annexures tell the position in Ovamboland and Angola.

Smallpox.—A Committee was appointed " to consider the adoption of uniform regulations for the prevention of the introduction into southern and eastern Africa of smallpox from India," and made recommendations on the subject.

Rural Hygiene.—A Committee made an interesting report from which the following general principles emerged :—

" (*a*) That, in countries with a large backward native population, it would be, generally speaking, inadvisable to separate preventive from curative medicine, in so far as the personnel which comes in direct contact with the common people is concerned. The native races, in most countries, have to be convinced first of all that the personnel of the health organisation has the good of the people at heart, and that it can and will help them. This can be demonstrated most easily through curative activities, which provide an opportunity for tangible demonstration of helpfulness.

" (*b*) That neither preventive nor curative measures can achieve a marked degree of efficiency without full co-operation between the administrative and technical departments of Government and the Health Department.

" (*c*) That most important in the amelioration of health conditions are measures directed towards the raising of the economic status of the population ; this automatically results in the improvement of two, at least, of the most important factors operating towards raising the standard of national health—*i.e.*, nutrition and housing

" (*d*) That education in elementary hygiene is one of the most important activities. This should commence in the primary schools, where it should take the form of instruction in practical hygiene and not, as is at present too often the case, theoretical instruction principally in elementary anatomy and physiology.

" (*e*) That both in the preventive and curative organisations in many African territories, whether colonial or dominion, and probably elsewhere, native personnel must be utilised to the fullest possible extent."

These principles are discussed in the report, and those who are interested should consult it.

Other matters under consideration were the control of leprosy in Africa, dengue, and the transmission by aircraft of diseases other than yellow fever. *A. G. B.*

APPENDIX

PLAGUE-INFECTED RODENTS IN SOUTH AFRICA AND ASSOCIATED MAMMALS WITH THEIR COMMON ECTOPARASITES

1. **House rat** (*Rattus rattus*)
Louse *Polyplax spinulosus*, Burm
*Fleas : *Xenopsylla cheopis*, Rothsc
Leptopsylla musculi, Dug
Xenopsylla brasiliensis, Baker
Ceratophyllus fasciatus, Bosc
Ceratophyllus londiniensis, Rothsc
Ctenocephalus canis, Curt

2 **Brown rat** (*Rattus norvegicus*)
Louse *Polyplax spinulosus*, Burm
Fleas *Xenopsylla cheopis*, Rothsc
Ceratophyllus fasciatus, Bosc
Leptopsylla segnis, Schonh

3 **House Mouse** (*Mus musculus*)
Fleas According to BEDFORD, no parasites have been found on this mouse in South Africa This view is certainly wrong, as during plague outbreaks officers of the Department have found plague-infected mice with fleas Some of these have been identified as *Leptopsylla musculi* which has been proved capable of conveying plague

4 **Gerbille** (*Tatera lobengulae*)
Ticks *Haemaphysalis leachi*, Aud
Ixodes pilosus, Koch
Mites *Laelaps muricola*, Trägårdh
Haemolaelaps sp
Louse *Linognathoides faurei*, Bedf
Fleas *Dinopsyllus lypusus*, J & R
Chiastopsylla rossi, Watrst
Xenopsylla eridos, Rothsc
Listropsylla stygius, Rothsc
Ctenophthalmus calceatus, Watrst
Leptopsylla musculi, Duges

5. **Multimammate mouse** (*Mastomys coucha*)
Mite . *Laelaps muricola*, Trägårdh
Louse . *Linognathoides faurei*, Bedf.
Fleas *Dinopsyllus lypusus*, J & R
Xenopsylla eridos, Rothsc.
Chiastopsylla rossi, Watrst.
Xenopsylla brasiliensis, Baker
Pulex irritans, L

6 **Ground Squirrel** (*Geosciurus capensis*)
Mite . *Haemolaelaps sp*
Louse *Linognathoides faurei*, Bedf
Fleas *Xenopsylla erilli*, Rothsc
Ctenocephalus canis, Curt
Echidnophaga bradyta, J. & R.
Echidnophaga gallinaceus, Westw
Xenopsylla eridos, Rothsc
Dinopsyllus lypusus, J & R
Pulex irritans, L

7 **Spring hare** (*Pedetes caffer*)
Tick *Ixodes pilosus*, Koch
Mites *Androlaelaps sp*
Haemolaelaps sp
Louse *Eulinognathus denticulatus*, Cummings
Flea *Xenopsylla caffer*, J & R.

8 **Striped mouse** (*Rhabdomys pumilio*)
Mite *Laelaps muricola*, Trägårdh.
Fleas *Dinopsyllus lypusus*, J & R
Xenopsylla eridos, Rothsc
Chiastopsylla rossi, Watrst
Listropsylla agrippinae, Rothsc.
Listropsylla chelurae, Rothsc
Dinopsyllus longifrons, J & R
Xenopsylla hirsuta, Ingram

9 **Karroo rat, eastern** (*Paratomys luteolus*)
Fleas . *Chiastopsylla pitchfordi* (*sp nov*)
Listropsylla agrippinae, Rothsc
Dinopsyllus longifrons, J & R.
Xenopsylla eridos, Rothsc
Chiastopsylla rossi, Watrst

10 **Karroo rats** (*Myotomis granti*)
Fleas *Listropsylla agrippinae*, Rothsc
Dinopsyllus lypusus, J & R
Xenopsylla eridos, Rothsc.
Chiastopsylla pitchfordi (*sp nov*)
Chiastopsylla rossi, Watrst

(*Myotomys broomi*)
Fleas : *Chiastopsylla mulleri* (*sp nov*)
Listropsylla agrippinae, Rothsc
Chiastopsylla rossi, Watrst
Xenopsylla eridos, Rothsc.
Hypsophthalmus aganippes, Rothsc.

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*Ectoparasites (fleas arranged in order of frequency of occurrence)

11. **Namaqua gerbille** (*Desmodillus auricularis*)
Fleas : *Xenopsylla eridos*, Rothsc.
Dinopsyllus lypusus, J. & R.

12. **Hare*** (*Lepus capensis*)
Tick : *Haemaphysalis leachi*, Aud.
Fleas : *Ctenocephalus canis*, Curt.
Xenopsylla eridos, Rothsc.

13. **Dwarf mouse** (*Leggada deserti*)
Fleas : *Dinopsyllus lypusus*, J. & R.
Xenopsylla eridos, Rothsc.
Listropsylla stygius, Rothsc.

14. **Fat mouse** (*Steatomys krebsi*)
Fleas : *Dinopsyllus lypusus*, J. & R.
Listropsylla stygius, Rothsc.

15. **Large-eared mouse** (*Malacothrix typicus*)
Fleas : *Dinopsyllus lypusus*, J. & R.
Xenopsylla eridos, Rothsc.
Listropsylla stygius, Rothsc.

16. **Vlei rat** (*Otomys irrotarus*)
Fleas : *Dinopsyllus lypusus*, J. & R.
Xenopsylla eridos, Rothsc.
Xenopsylla cheopis, Rothsc.

17. **White-tailed rat** (*Mystromys albicaudatus*)
Fleas : *Dinopsyllus lypusus*, J. & R.
Chiastopsylla rossi, Watrst.
Xenopsylla cheopis, Rothsc.

18. **Suricate** (*Suricata suricatta*)
Tick : *Haemaphysalis leachi*, Aud.
Fleas : *Ctenocephalus canis*, Curt.
Xenopsylla erilli, Rothsc.
Echidnophaga bradyta, J. & R.
Echidnophaga gallinaceus, Westw.
Xenopsylla eridos, Rothsc.
Chiastopsylla rossi, Watrst.

19 **Yellow mongoose** (*Cynictis penicillata*)
Tick : *Haemaphysalis leachi*, Aud.
Fleas : *Ctenocephalus canis*, Curt.
Xenopsylla erilli, Rothsc.
Echidnophaga bradyta, J. & R.
Echidnophaga gallinaceus, Westw.
Xenopsylla eridos, Rothsc.
Chiastopsylla rossi, Watrst.

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*Two other varieties of hare—namely, the *Lepus saxatilis* and *Lepus zuluensis*—have also been incriminated, but their associated ectoparasites do not yet appear to have been accurately recorded.

REVIEWS AND NOTICES.

ROYAUME DE BELGIQUE. **Fonds Reine Elisabeth pour l'assistance médicale aux indigènes du Congo Belge (Foréami). Rapport annuel sur l'exercice 1931.** [Report for 1931 of the Queen Elisabeth Fund for Medical Assistance to the Natives of Belgian Congo.]—142 pp. With 12 figs. on 5 plates, 7 diagrams & 6 maps. 1932. Bruxelles: Marcel Hayez, Imprimeur de l'Académie Royale de Belgique, 112 rue de Louvain.

Dr. DUPUY's report sets out at great length and in much detail the local arrangements made to facilitate the working of the medical units of this special organization, not only with regard to the medical subdivision of the country but also in relation to the co-operation of "Foréami" with the existing government and other medical services such as missions.

Emphasis is laid on the necessity for obtaining all possible information as to the increase or decrease of populations in the selected areas, and to this end a considerable amount of work has been carried out on the birth rate, and the death rates of various age groups from diseases which are endemic or epidemic.

The subject of the influence of venereal disease in lowering the birth rate is especially reverted to, and the importance of gonorrhoea in this respect is stressed. The author points out that accurate information as to abortion and still-births is very difficult to obtain in a country where such incidents may result in the woman being sent away by her husband. Of the various forms of marriage arrangement the author expresses a preference for bigamy as being that best adapted to the domestic needs of the native and the most favourable for the increase of population.

Among the diseases enumerated sleeping sickness is the one which receives most attention; other diseases, yaws, leprosy, malaria, phagedaenic ulcers, amoebic dysentery and helminthiasis, being briefly discussed. For each district figures are given of the new cases of trypanosomiasis found during the year, of the old cases under treatment, and of the results, whether cured, died or disappeared.

Dr. Dupuy thinks that the ascertained steady diminution of the incidence of sleeping sickness in such an area as Mayumba, where arsenic-incurable cases are many, can only be explained on the basis of the feeble transmissibility of the "arsenic-resistant" strain. [Recent work by YORKE and his collaborators (*ante*, p. 448), however, proves that an arsenic-resistant strain can without difficulty infect glossina, and further, that the resistance is retained by the trypanosomes unaltered even after two passages through the fly.] The examinations deal with large figures; among 355,855 natives medically examined by officers of Foréami in 1931, 1,648 new cases of sleeping sickness were found, while 7,470 old cases were undergoing treatment; 5,398 lumbar punctures were carried out during the year.

The author mentions several factors not in themselves strictly medical which adversely affect the proper functioning of such an organization as this. One is the problem of the small villages, isolated and remote, which have sprung up as a result of the splitting off of certain households from large villages, or are the last remains of villages long since decayed; visits of medical officers to these numerous small hamlets are expensive affairs, with long journeys and many carriers to pay. Another is the fact that the death rate is very high among those tribes who do not cultivate vegetables and fruits; he urges the importance of the agriculturist taking his share in the work of raising the standard of health by the training and education of the people in proper methods of cultivation.

The section on infant mortality illustrates how necessary it is to reach some accepted international standard for this classification. Such sentences as "Sur les 16,957 nourissons, 1,645 meurent par an, soit près de 98%" may be at least a partial explanation of some of those "fantaisiste" infant death rates which, the author rather complains, have been attributed by some writers to parts of the Belgian Congo.

Those who are working at the development of medical services for the remoter natives in tropical countries should consult the original report, where they will find much information in numbers of figures and tables embodying the results obtained. *D. B. Blacklock.*

CALCUTTA. **Tenth Conference of Medical Research Workers held at Calcutta from 5th to 10th December 1932.**—pp. iii+203. 1933. Simla: Government of India Press.

A conference of this sort strikes the imagination as being ideal for the promotion of research. It is not an ordinary scientific congress, for the members are all, or nearly all, delegates who are experts in the particular researches which they are conducting or directing. In this conference we see the meeting of those having the power of recommendation of necessary funds with the workers themselves and the effect of what is equivalent to a critical parliamentary opposition, though not on party lines, upon the proposals for new work or the continuation of old work. The list of delegates and their official standing show how abundant and varied are their qualifications for the promotion of research. The Director-General of the Indian Medical Service, the Public Health Commissioner of the Government of India, directors and assistant directors of the research institutes, professors at the Medical Colleges and at the important School of Tropical Medicine, the assistant-director of Hygiene and Pathology Army Headquarters, the directors and assistant directors of public health of the provinces, the director of the Zoological Survey of India, the director of the Botanical Survey of India, the deputy-director of Agriculture (Cinchona) and the Animal Husbandry expert, a representative of the Rockefeller Foundation, chief medical officers of railway systems, chemical examiners to Government, the imperial serologist to Government and others are present here to confer with each other and with the other workers. Six days of strenuous work seems almost too short for a time to traverse the range of subjects which come up for discussion, but it must be remembered that the conference is an annual one. We find, as might be expected, the matter contained in these transactions of extreme interest for tropical medicine, from the opening speech by the chairman to some of the detailed appendices which are supplied at the end of the brochure. It is interesting to have placed on record the opinion that the publications of the Bureau of Hygiene and Tropical Diseases are " absolutely essential to every research worker in India " ; [the Indian Research Fund Association backs this opinion with an annual contribution to the Bureau].

In these transactions we have set out much information of a particular sort which has a bearing on the research questions of the day and, we may add, " of the fray." Fortunately these are usually published in the current journals. Under the heading of the Drug Addiction Enquiry it is interesting to learn with regard to opium that even at the present time " 0·5 to 1 per cent. of the population used the drug habitually," that " cocaine eating was widespread and chloral hydrate was a new and dangerous addiction." A third hamster, it is announced, on which infected sandflies were fed, has become infected with Leishmania. One of the fundamental questions for biologist and chemist alike is the nature of the bacteriophage. It is referred to in discussion as diffusing freely in solution like an inorganic salt and, in opposition to this, as having been proved to be corpuscular in nature. How best to get rid of 400,000 lbs. of quinine profitably for public health purposes was the subject of some interchange of opinion. Another highly important subject on which nations, provinces and even towns are peculiarly sensitive is the endemicity of disease. It is not on cholera, on this occasion, that the discussion turns but on plague. 'There is little basis, it is contended, " for the statement . . . that Rangoon had constantly infected other ports by shipping infected rats in cargo. . . . The ships that visit Rangoon were more likely to bring infected rats and fleas than to take them away."

The work of the conference is not by any means restricted to tropical diseases and we may instance the important work going on in regard to maternal mortality in childbirth. A maternal mortality in a series of 31 tea gardens of 42 per 1,000 births is very striking, and probably half of it is due to anaemia of pregnancy. The anaemia " is very likely related to a diet deficiency " of vitamin B. Nutritional diseases receive very special attention in India and the large-scale work which has been done there, is regarded generally as of the highest importance. The promised publication on tropical skin-diseases will be looked forward to.

Appendices to these transactions total forty and while many of them are official, others represent notable contributions to research literature. Those referring to work on malaria, plague, cholera, bacteriophage, rabies, kala azar, nutritional research, the Simuliidae, anaemia of pregnancy, indigenous drugs, skin diseases, and the flora and fauna of water supplies are some of the " notes " which may be mentioned as noteworthy.

W. F. Harvey.

MARTINI (E.). **Zoonosen der Haut in wärmeren Ländern.** [Zoonoses of the Skin in Warm Countries.]—Reprinted from Jadassohn's *Handbuch d. Haut- u. Geschlechtskrankheiten.* 1932. Vol. 12. No. 1. pp. 575–707. With 59 figs.

This section of Jadassohn's handbook of diseases of the skin and venereal diseases, deals with those cutaneous affections of the tropics which are caused directly by the attacks of animals. It is complementary to a section by W. PICK, that has not yet appeared, which will deal with the corresponding conditions occurring in temperate zones. Since many " zoonoses " are prevalent in all regions, the authors have been obliged to divide the subject between them in a more or less arbitary fashion. They have excluded parasitic diseases that are transmitted by insects or other animals, and they have excluded allergic conditions which chance to be due to animal products, such as urticaria caused by specific proteins. There is left a residuum of conditions about which it is often very difficult to obtain information from text books, and which it is therefore most useful to have brought together in a single volume. These are arranged in three groups. (i) The first includes the toxic effects of insects on the skin. Here the stings of wasps and bees are described, and the urticating hairs of certain moth larvae, and the various types of blistering beetles (including also an account of the beetle larva which is extracted to produce an arrow poison by natives in the Kalahari Desert). The greater part of this section is devoted to a detailed discussion of the mechanism of the lesions caused by blood-sucking insects. The evidence in this field is conflicting, but Martini supports the view that several factors are at work. The wheal formation which follows immediately after biting is probably always an allergic phenomenon, but the cause of the persistent itching papules is uncertain. This part is illustrated by a series of photographs of the effects of insect bites. (ii) The second section treats of insects which are stationary parasites of the skin : the chigger flea and the myiasis producing maggots. Myiasis is divided into two forms—myiasis benigna, which comprises infestation by the tumbu fly (*Cordylobia*) in Africa and *Dermatobia* in tropical America, and myiasis maligna caused by various species of *Chrysomyia, Wohlfartia* and *Sarcophaga.* The species responsible for myiasis maligna in different parts of the world (so far as they are at present known) are listed. (iii) The third section is the shortest and includes brief accounts of the toxic effects of coelenterates, echinoderms, molluscs, spiders, scorpions and myriapods. The publication concludes with a bibliography of 22 pages, classified according to subjects.

V. B. Wigglesworth.

Kranzfeld (A. M.). **Parasitic Worms of Man. An Introduction to Medical Helminthology.**—120 pp. With 8 plates and 54 text figs. 1931. Moscow—Leningrad (State Medical Publication). [In Russian.] [Roubles 2.50.]

This is a short text-book of medical helminthology, intended for the use of medical students and practitioners. Since its main object is to serve as a guide for laboratory work, the material is treated almost exclusively from the general zoological point of view. The first part of the book contains an account of the biology and physiology of parasitic worms, followed by a description of the general pathology of helminthic infections. The methods of laboratory diagnosis are described in some detail and there is a section devoted to the epidemiology of helminthiasis. In the systematic description of the worms, to which the main part of the book is devoted, particular attention is given to forms occurring in Russia. The descriptions are illustrated chiefly by line-drawings, and there are a number of useful diagrams and tables summarizing, in schematic form, the information given in the text. *C. A. Hoare.*

Philiptschenko (A. A.). [**Intestinal Protozoa, and the Diseases caused by them. A Manual for Medical Practitioners and Laboratory Workers.**]—212 pp. 1933. Leningrad: State Medical Publications. [In Russian.] [Roubles 4·50].

This is a manual of human intestinal protozoa for the use of Russian medical practitioners and laboratory workers. About two-thirds of the book, comprising seven chapters, are devoted to amoebiasis in all its aspects: aetiological, clinical, epidemiological and therapeutical. The remaining four chapters deal with the intestinal flagellates, coccidia and infusoria. The treatment of the subject is conventional, though more than usual attention is given to the morphology and biology of the protozoa, as one of the objects of the book is to serve as an introduction to parasitology in general. The illustrations, the majority of which are not original, are reproduced much better than in other recent publications from U.S.S.R. The book as a whole is up-to-date, with the glaring exception of the chapter on coccidiosis, in which *Eimeria wenyoni*, *E. oxyspora* and *E. snijdersi* are still described as human parasites The bibliography contains about 400 references, and there is an alphabetical index. *C. A. Hoare.*

Kikuth (Walter). **Die Bartonellen und verwandte Parasiten bei Mensch und Tieren.** [The Bartonellas and Related Parasites in Man and Animals.]—Reprinted from *Ergebnisse d Hyg. Bakt. Immunitätsforschung u. Experim. Therap.* 1932. Vol. 13. pp. 559–619. With 12 text figs. [10 pages of refs.]

During recent years a large amount of experimental work has been carried out on the small bacillus-like organisms known as *Bartonella* and their allies which invade the red blood corpuscles of man and animals. Graham-Smith in 1905 gave the first account of one of these from the mole. It was named *Grahamia* by Tartakowsky in 1910 and *Grahamella* by Brumpt in the following year. Since their first description the number of species of *Grahamia* has been steadily on the increase and a large number of small mammalian hosts are now known. Related but somewhat different organisms were seen by Barton in 1909 in the red blood corpuscles of cases of Oroya fever. They were rediscovered by Strong and his collaborators and named by them in 1915 *Bartonella bacilliformis*. Noguchi investigated this organism, obtaining it in pure culture, and by inoculation of monkeys proved what had long been suspected, that Oroya fever and verruga peruviana were different manifestations of one and the same infection. Similar investigations were carried out at about the same time by Mayer and Kikuth. In 1921 Mayer discovered inclusions in the red blood corpuscles of anaemic rats and named them *Bartonella muris*. Lauda then observed the regular appearance of these bodies in the red blood corpuscles of rats after splenectomy and it was quickly realized that the inclusions were parasites capable of causing severe anaemia. The observations on the influence of the spleen and its bearing on problems of immunity stimulated numerous investigators to take up their study so that a mass of literature on the subject has now accumulated. Similar parasites have been discovered in the hamster, mouse, dog and other animals and much work has been done on the relation of these forms to one another. It is now clear that animals become infected and if they recover become chronic carriers of the parasite which increases rapidly in numbers again if the spleen is removed. Another organism occurring in or on the red blood corpuscles was discovered in mice by Schilling, who named it *Eperythrozoon coccoides*. These are round or spherical bodies and thus differ from the bacillus-like *Bartonella* which more closely resemble the *Grahamella* or *Grahamia*, as they should be called. There is this important difference, that splenectomy has not the influence on *Grahamella* infections that it has on those due to *Bartonella*. There are yet other bodies which occur in red blood corpuscles the nature of which is still more obscure. It seems evident that all these various bodies are related to one another, and the author, who has himself contributed largely to our knowledge of these organisms, has rendered a great service to parasitology and haematology by gathering together the scattered literature and critically reviewing it in the 60 pages of this very interesting and valuable illustrated publication.

C. M. Wenyon.

d'Oelsnitz (M.). **Diagnostic et traitement du kala-azar méditerranéen de l'enfant et de l'adulte.** Preface du Pr. Fernand Bezançon. [Diagnosis and Treatment of Mediterranean Kala Azar.]—pp. viii+110. With 18 figs. 1933. Paris, VI : Masson et Cie, 120 Boulevard Saint-Germain. [17 fr.]

This little book has been written for those who are likely to encounter kala azar in children and adults in the South of France, where the disease, regarded hitherto, in adults at least, as always of extraneous origin, is now actually endemic and apparently on the increase The ninety odd pages give all the essentials of clinical features, differential diagnosis and treatment of kala azar so that the book is bound to be of use to those who have had no previous experience of the disease. A few pages are devoted to other matters, such as geographical distribution, the causative organism and the method of transmission. It is clear that the author is not conversant with much of the work which has been carried out with sandflies, for he states that the dog tick has been incriminated as a probable vector more than any other insect. This statement is based on certain quite inconclusive experiments of Blanc and Caminopetros. Apart from this the book appears to be free from misstatements and amply fulfils the function for which it was intended. *C. M. Wenyon.*

Madrid. **Memoria de la Campaña contra el paludismo (1930–1931).** [The Antimalaria Campaign in Spain.] Ministerio de la Gobernación, Dirección general de Sanidad. Comisión Central de Trabajos Antipalúdicos.—pp. xvii+341. With 6 figs. & 5 graphs. 1932. Madrid.

This report is already so subdivided that it cannot be profitably reviewed or abstracted. In 321 pages account is given of the prevalence of malaria and of other diseases—enteric, undulant fever, leishmaniasis, tuberculosis, etc.—in 43 districts, the splenic and parasitic indices and the measures taken to deal with the problem in each. The information is presented in text and in tables. Appended is a chapter of entomological data, giving the various species of mosquitoes and Phlebotomus found in Spain, their geographical distribution and by whom recorded. *H. H. S.*

MONTEIRO (J. Lemos). **Estudos sobre o typho exanthematico de S. Paulo.** [Studies on Sao Paulo Typhus Fever.]—*Mem. Inst. Butantan.* 1931. Vol. 6. pp. 1–135. With 54 charts & 6 plates (3 coloured). [67 refs.] English summary pp. 125–132.

This is a monograph concerning the S. Paulo type of typhus fever, written by Professor Monteiro and in it are gathered into one all that he has previously done and published on this interesting disease. The whole consists of ten chapters and is divided into two parts, the first giving an account of the properties of the virus and the results of experimental work on various laboratory animals, the second discussing the connexion of *Rickettsia brasiliensis* with the infection.

The separate papers dealing with the question have already been reviewed (see this *Bulletin* 1932, Vol. 29, pp. 17, 447, 778; 1933, Vol. 30, p. 391). The English summary is sufficiently full to furnish an excellent picture of the disease and to demonstrate points of difference from other forms of endemic typhus. *H. H. S.*

RUGE (Reinhold). **Tropenkrankheiten.** [Tropical Diseases.]—Reprinted from *Handbuch der gesamten Unfallheilkunde.* [1932.] Vol. 2. pp. 260–313. With 9 figs. [1 page of refs.] [Review appears also in *Bulletin of Hygiene.*]

This article deals with the medico-legal aspects of occupational insurances and with claims for compensation by sailors, who have contracted tropical diseases as a result of their calling. Detailed descriptions of tropical diseases, their pathology and treatment are not given, and mention is made only of those diseases of warm climates to which sailors are ordinarily exposed.

There is a useful summary of the main features of chronic and latent malaria, and it is emphasized that men, suffering from such sequelae as trigeminal neuralgia and various forms of paralysis, may be unfairly suspected of malingering if the possibility of a former malarial infection is overlooked. Difficulty may also occur in estimating the validity of claims for compensation for the occasional ill-effects of treatment, such as atoxyl blindness, quinine amaurosis, etc. Quinine idiosyncrasy and acquired hypersensitiveness to quinine are also discussed.

The article is valuable since it lays stress upon certain features of tropical diseases which are, as a rule, rather neglected in ordinary text-books. *H. J. Walton.*

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES
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RABIES.

A REVIEW OF RECENT ARTICLES. XIX.*

i. *Virus.*

In a fully illustrated paper LEVADITI, SCHOEN & MEZGER[1] collect the researches already summarized (this *Bulletin*, Vol. 30, p. 134), from communications to the *Bull. Acad. Med.* and the *C. R. Soc. Biol.* They hold the opinion that the " parasite of rabies " should be called *Glugea Lyssae*, and not as has been proposed by MANOUELIAN & VIALA, *Encephalitozoon rabiei*. The morphological appearances in no way resemble those of *Encephalitozoon cuniculi*. The spores of the latter have a uniform appearance, and their volume in rabbits and mice is invariable. Their structure is perfectly definite and so also are the cysts or pansporoblasts which enclose them. The oxyphil corpuscles described by LEVADITI and his co-workers in rabies infections of mice, though they resemble in certain stages those described by MANOUELIAN & VIALA in the rabbit and the dog, are in reality pansporoblasts consisting of an infinity of sporules of dimensions which are almost ultra-microscopic. The sporules do not possess definite characters at all comparable with the spores of *Encephalitozoon cuniculi*.

A further study of the cystic stage of " Glugea Lyssae " in the white mouse has been made by LEVADITI & MEZGER,[2] using dark ground illumination with a magnification of about 1,800 diameters. The cysts measure from 5 to 20 micromillimetres. They are covered by a refractile membrane, and are round or ovoid. These sacs contain the young cysts whose number is proportional to the size of the envelope. The young cysts are also covered by a refractile membrane, they enclose a dark substance, and are separated from each other by granular material.

That the " noyau optique basal " of NICOLAU & KOPCIOWSKA and what THOMAS & JACKSON call the " nucleus oculomotorius " is a seat of election for Negri bodies has been already referred to (Vol. 28,

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* For the eighteenth of this series see Vol. 30, pp. 133–143.

[1] LEVADITI (C.), SCHOEN (R.) & MEZGER (J. G.). Etude morphologique du virus rabique.—*Arch. Internat. Méd. Experim.* 1932. Dec. Vol. 7. No. 4. pp. 655–692. With 21 figs. & 1 coloured plate. [Refs. in footnotes.]

[2] LEVADITI (C.) & MEZGER (J. G.). Structure polykystique du parasite de la rage.—*C. R. Soc. Biol.* 1933. Feb. 10. Vol. 112. No. 5. pp. 440–442. With 1 fig.

p. 744 and Vol. 29, p. 600). [There is no doubt in the reviewer's mind that the seat of election described by the latter authors in October 1930 is the same as that described by the French authors in May 1932.] The French authors, it will be remembered, found Negri bodies in this region in fixed virus rabies of rabbits. They[3] confirm this observation in the case of two strains of fixed virus, one a virus of *Chien fou* isolated by MATHIS & CONSTANTINESCO (Vol. 29, p. 597), and the other a highly virulent strain of fixed virus isolated by JONNESCO in Rumania (Vol. 30, p. 136). In the case of the Mathis strain the inclusions are much more numerous and of larger dimensions in the seat of election than in the horn of Ammon. In the case of the Rumanian strain they are so small and rare as to be practically non-existent in the horn of Ammon, whereas in the elective zone they are numerous, of large dimensions, and show the characteristic internal structure.

A full account of the occurrence of rabies in the Union of South Africa is given by NEITZ & MARAIS.[4] The summary by DUTOIT quoted in this *Bulletin*, Vol. 28, pp. 742–743, brought the history up to 1928. It now appears that since that date the existence of rabies has been proved in thirty instances, and presumed on clinical evidence in six other instances. Of these, eight have occurred in the human subject. As before genets and meerkats appear to be the most usual source of infection. Photographs of these animals are given, and also maps showing the distribution of the disease. The probable origin of the infection is discussed, and methods of control, adopted and proposed, are considered.

It will be remembered that VAUCEL, BOISSEAU & SALEUN proved by cross immunity experiments that a strain of street virus from Brazzaville (French Equatorial Africa) was identical with the rabies virus of Europe. VAUCEL & SALEUN[5] have now studied three other strains of virus from the same vicinity. In each case they have experienced no difficulty in passaging the strain through many generations, and in two, crossed immunity experiments have shown that the viruses were identical with rabies. " In spite of the diversity and indefiniteness of the symptoms observed in the animal, the three strains which have been studied have behaved, from the histological point of view, like those of true rabies."

An exceptionally virulent strain of street virus is described by PALAWANDOW & SEREBRENNAJA.[6] It was obtained at the Odessa Institute from the saliva of a twelve-year-old girl, bitten by a dog on the leg. She had received no treatment and developed rabies after an incubation period of two months. The first passage of saliva intramuscularly into a guineapig gave an incubation period of 12 days. In eleven subdural subpassages in guineapigs the incubation varied from 1 to 4 days and averaged about 2½ days. The minimal lethal dose was 0·2 cc. of a 1 in 75,000 dilution. The virus is now in its 40th passage. After the eleventh passage a feature of extraordinary interest was noticed—that the incubation periods gradually lengthened. From the 10th to the 29th passages the incubation for guineapigs was 3–3½ days, and for rabbits 3–4 days. After the 29th the incubation period for guineapigs was 4–6 days, and for rabbits 5–7 days; in fact the virus had become fixed virus. [It is impossible to reconcile these facts with the view which is usually held that fixed virus is a virus which has become accommodated to the easier mode of transmission from brain to brain, whereas street virus is accustomed to a much more complicated transmission from saliva to nerve-endings and central nervous system and *vice versa* at each passage. The authors assume that in the case of the Sokolan strain (described above) the virus comes to equilibrium as a fixed virus, after the elimination of some *accelerating* influence.]

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[3] NICOLAU (S.) & KOPĆIOWSKA (L.). Rage du lapin, à virus fixe, et corps de Negri ; dénombrement comparatif des inclusions dans la corne d'Ammon et dans la zone élective (noyau optique basal).—*C. R. Soc. Biol.* 1933. Feb. 10. Vol. 112. No. 5. pp. 445–448. With 2 figs.

[4] NEITZ (W. O.) & MARAIS (I. P.). Rabies as it occurs in the Union of South Africa.—*Union of South Africa. 18th Report, Director Vet. Services & Animal Industry, Onderstepoort, Pretoria. 1932. Aug.* pp. 71–98. With 5 figs. & 6 maps. [32 refs.]

[5] VAUCEL (M.) & SALEUN (G.). Rage canine en Afrique Equatoriale Française. —*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1018–1021.

[6] PALAWANDOW (Haidar) & SEREBRENNAJA (A. I.). Ueber einig Eigentümlichkeiten der im Odessaer Bakteriologischen Institute isolierten Strassenvira.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 3/4. pp. 230–238. [12 refs.]

The strain of fixed virus employed at Budapest has been examined by AUJESZKY & KERBLER.[7] This virus was taken from a dog by Högyes in 1886 and is now in (approximately) its 17,000th passage. The dose which will kill with certainty when injected subdurally is 0·15 cc. of a dilution of 1 in 6,000, that is to say 0·025 milligrammes of brain substance. The incubation period has shortened—paralysis on the 5th day—and the period of illness has also diminished.

In a previous communication (this *Bulletin*, Vol. 29, p. 189), SHOPE drew attention to the close resemblance between the virus of the "mad itch" of cattle in America, and the pseudo-rabies of AUJESZKY. He has now[8] carried out cross immunity experiments between a "mad itch" virus obtained from a cow in Iowa, and a pseudorabies virus furnished by Aujeszky from Budapest. The various mixtures of serum and virus were stored in the refrigerator over night. The results were as follows:—

Virus	Serum	No. of Guineapigs	No. Died
Pseudorabies	Normal	5	5
,,	Pseudorabies convalescent	6	0
,,	Mad itch convalescent	4	0
Mad itch	Normal	5	5
,,	Pseudorabies convalescent	6	0
,,	Mad itch convalescent	4	0

1 cc. of a 10 per cent. suspension of virus was mixed with 0·5 cc. serum from a pig; 1·5 cc. of the mixture was inoculated subcutaneously. "In recognition of the identity . . . . the mad itch virus will in future be designated as Pseudorabies Virus (Iowa strain)."

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[7] AUJESZKY (A.) & KERBLER (F.). Ueber Veränderungen der biologischen Eigenschaften des Virus fixe.—*Giorn. di Batteriol. e Immunol.* 1933. Feb. Vol. 10. No. 2. pp. 257–266. [10 refs.] English summary.

[8] SHOPE (Richard E.). Identity of the Viruses causing "Mad Itch" and Pseudorabies.—*Proc. Soc. Experim. Biol. & Med.* 1932. Dec. Vol. 30. No. 3. pp. 308–309.

In a second communication[9] SHOPE continues his study of this strain. The virus was passaged separately through the brains of 9 guineapigs and 12 rabbits. From titration experiments it appeared that following fatal cerebral infection the virus is ten times more prevalent in rabbit brain than in guineapig brain, and that the guineapig is about 100 times more resistant to subcutaneous dosage than is the rabbit. "Over and above the working of these two factors, guineapig passage appears to achieve some actual attenuation of virus when tested by subcutaneous inoculation into guineapigs."

According to REMLINGER & BAILLY[10] the virus of the pseudo-rabies of AUJESZKY when injected into the tissues of a receptive animal does not suffer any "eclipse" (this *Bulletin*, Vol. 27, p. 252). It multiplies *in situ* until it passes into the blood and from thence into the central nervous system. Here it multiplies abundantly and may be used for subpassage. The points to be noticed are that the Aujeszky virus travels to the central nervous system by way of the blood and lymphatics, and not along the nerves. In certain cases an infected animal may die before the virus has reached the centres. The duration of the illness is so short (a few hours) that the phenomenon of auto-sterilization does not occur. Nothing is known regarding the localization of the virus in the brain. After the central nervous system has become infective, the virus may pass centrifugally along the peripheral nerves, but death often occurs before this takes place. It will be seen from the above that two stages occur: a blood phase during which the animal may die, and then a nerve phase. It is not surprising that various organs are found to be more infective than is the case in rabies. The disease has been reproduced from inoculations of liver pulp, of spleen, kidney, testicle, suprarenals, bone marrow, etc. "Special mention ought to be made of the presence of the virus in the lung, as was found by Shope in 'mad-itch' which appears to be a form of the disease of Aujeszky." Saliva, bile, urine, and faeces on the other hand failed to infect rabbits and guineapigs. Transmission by biting has always been unsuccessful.

A further study of the virus of *mal de caderas* has been made by COSTA.[11] It will be remembered (this *Bulletin*, Vol. 29, p. 189) that REMLINGER & BAILLY, from extended experiments with a virus supplied by ROSENBUSCH, concluded that it was a rabies virus. COSTA comes to the same conclusion, but adds that it is a strain of rabies virus with peculiar modifications. Its clinical manifestations in herbivora are not the same as those of rabies virus, and transmission to man appears to be very unusual. A sero-vaccine prepared, after the manner of FERMI, from a strain of *mal de caderas* virus which had been fixed by subpassage, afforded adequate protection against the disease, but a similar vaccine prepared directly from a cow which was killed in the paralytic phase of *mal de caderas* was ineffective. The fixed virus vaccine consisted of 3 parts of a 30 per cent. brain emulsion added to 1 part of immune serum. It is stated that since prophylactic treatment with this vaccine " the epizootic has totally disappeared."

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[9] SHOPE (Richard E.). Modification of the Pathogenicity of Pseudorabies Virus by Animal Passage.—*Jl. Experim. Med.* 1933. June 1. Vol. 57. No. 6. pp. 925–931.

[10] REMLINGER (P.) & BAILLY (J.). Le siège du virus dans la maladie d'Aujeszky expérimentale.—*C. R. Soc. Biol.* 1933. Vol. 113. No. 18. pp. 125–126.

[11] COSTA (M. Humberto). Contribución al estudio del mal de caderas de los bovinos. II. Estudio experimental del virus y la vacuna.—*Rev. Higiene y San. Pecuarias.* 1933. Jan.–Feb. Vol. 23. No. 1–2. pp. 5–24. [16 refs.]

Zibordi[12] has failed on three occasions to transmit fixed virus through the pulp of the canine tooth of the dog. The injections were made through an opening which had previously been made with a trephine. A similar experiment on two dogs with street virus also failed. Rabies did not develop in any of the animals inoculated by this route. That the viruses were potent was proved by control experiments using various routes.

ii. *Symptomatology.*

A case of rabies with an incubation period of 14 months is described by Hajare.[13]

The clinical features of two cases of rabies are reported from Philadelphia, U.S.A., by Reisman, Fox, Alpers & Cooper.[14] In one of the cases an autopsy was performed, and the microscopic appearances in the brain and cord are described in detail. Neither case presented any unusual features.

iii. *Diagnosis.*

Serebrennaja & Pugatsch[15] recount their experiences in the diagnosis of rabies. During six years they have examined 1,096 brains of suspected animals. Of the three methods of staining employed, those of Stutzer, Muromzew and Turewitsch, they have found the last to be the most exact. The composition of this stain is given as haematoxylin, acid fuchsin and picric acid, without further details. From their results they conclude that Negri bodies are living growing bodies with a definite life cycle.

iv. *Pathology.*

It will be remembered that Marie[16] obtained contradictory results when rabies virus was inoculated intramuscularly, intravenously or subcutaneously, after the reticulo-endothelial system had been blocked with Indian ink. He has now repeated these experiments with the difference that the infecting dose was introduced into the peritoneal cavity. The experimental details will be published later; the conclusions are stated to be as follows: (1) That even large doses of fixed virus do not infect when introduced into the peritoneal cavity is well known. (2) If, however, Indian ink emulsion is previously injected, infection occurs in guineapigs with an incubation period of from 9–20 days. In two sets of six animals, only one of the first set and two of the second failed to contract the disease. (3) A suspension of " Deinse " (2 cc. phosphate disodique 5 per cent., with 0·5 cc. chloride of calcium 5 per cent.) gave a similar result. (4) Guineapigs which survived after intraperitoneal injection of fixed virus (without previous treatment by Indian ink) were found to be not immune to intraocular inoculation.

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[12] Zibordi (D.). Studi sperimentali sulla trasmissione della rabbia.—*Giorn. di Batteriol. e Immunol.* 1932. Dec. Vol. 9. No. 6. pp. 929–940. [20 refs.]

[13] Hajare (S. S.). A Case of Rabies with an Unusually Long Incubation Period.—*Indian Med. Gaz.* 1933. Apr. Vol. 68. No. 4. p. 212.

[14] Riesman (David), Fox (W. W.), Alpers (B. J.) & Cooper (David A.). Hydrophobia. Report of Two Fatal Cases with Pathologic Studies in One.—*Arch. Intern. Med.* 1933. May. Vol. 51. No. 5. pp. 643–655. With 8 figs.

[15] Serebrennaja (A.) & Pugatsch (E.). Ueber die Rolle der Negrikörper bei der Diagnosestellung und Aetiologie der Tollwut.—*Zent. f. Bakt.* I. Abt. Orig. 1933. Feb. 23. Vol. 127. No. 7/8. pp. 417–426.

[16] Marie (A. C.). De l'infection rabique par la voie péritonéale.—*C. R. Soc. Biol.* 1932. Dec. 16. Vol. 111. No. 39. pp. 869–870.

HAVENS & MAYFIELD[17] continue their study of the antigenic properties of rabies virus (Vol. 29, p. 601). In the earlier communication it was found that fixed virus immune serum failed to cause flocculation of 1 out of 16 strains of street virus. The authors have now found three other strains which were not agglutinable. The antigenic composition of these inagglutinable strains are investigated in the present communication, using fixed virus as a basis for comparison. Nine strains (including the 4 non-agglutinable strains and one of fixed virus) and nine homologous immune sera, were set up against each other. The fixed virus was agglutinated by all the sera in approximately the similar degree, suggesting that all the strains possessed a common factor. " That they possessed additional factors in their antigenic composition was shown by the failure of all but one to agglutinate to the titre of the fixed virus." No two of the strains appeared to be identical. Cross absorption tests were then carried out. That the absorption was specific was indicated by the fact that normal brain suspensions had no absorptive power. Marked dissimilarities between particular strains were observed, but again there was evidence of the existence of some common factor. Viricidal tests were then carried out and these again disclosed the existence of " apparently fundamental differences between the strains. They also indicated, however, that it is the common factor that is most essential in the production of immunity." The differences observed seem to be due to the presence or absence in whole or in part, of additional antigenic factors.

GREVAL[18, 19] describes in detail a method based upon the Wassermann technique, for estimating the degree of complement fixation. He proposes to use this method both for comparisons of sera, and for comparisons of antirabic vaccines as antigens. From experiments, which are not given in detail, it appeared that the antigenic capacity of vaccines improved with keeping, and that rabbit brain vaccines were less potent as antigens than sheep brain antigens. He uses for complement fixation as antigen, a filtrate of a three months old 5 per cent. carbolized Paris (virus) sheep (brain) vaccine prepared as follows: The brain of a sheep is made into an 8 per cent. emulsion with 1 per cent. carbolic acid in normal saline; this is incubated for 24 hours at 37°C., and then diluted to a 5 per cent. suspension with normal saline. This is kept at room temperature for about 30 days before use.

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[17] HAVENS (Leon C.) & MAYFIELD (Catherine R.). Antigenic Properties of the Virus of Rabies. II. Multiplicity of Strains as shown by Agglutinin Absorption and Neutralization.—*Jl. Infect. Dis.* 1932. Nov.–Dec. Vol. 51. No. 3. pp. 511–518.

[18] GREVAL (S. D. S.). On Rabies. Complement Fixation in Rabies; the Technique, its Purpose and Associated Considerations.—*Indian Jl. Med. Res.* 1933. Jan. Vol. 20. No. 3. pp. 913–920. [13 refs.]

[19] GREVAL (S. D. S.). The Rôle of Serology in Rabies.—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 676–678. [13 refs.]

A case of transmission of fixed virus infection from mother to young is reported by SCHNEIDER & MCGROARTY.[20] A sheep was inoculated subdurally with 0·2 cc. fixed virus. Two days later it gave birth to a lamb. The sheep died of rabies on the sixth day after inoculation having nursed the lamb for four days. Twelve days after birth the lamb showed definite symptoms of rabies. The brain of the lamb was injected subdurally into two rabbits; both rabbits died of rabies in seven days.

v. *Methods of Treatment and Statistics.*

The investigation on the relative immunizing potencies of etherized and carbolized vaccines undertaken by CUNNINGHAM and his co-workers in accordance with the resolution of the International Rabies Conference (Paris 1927) has been frequently referred to in these reviews. (Vol. 24, p. 229; Vol. 25, p. 190; Vol. 26, p. 219; Vol. 27, p. 742.) It will be remembered that the results both of treatment of human beings and of experiments on rabbits and monkeys were best in the case of those treated by Alivisatos' method, less good when Hempt's vaccine was used, and poorest with carbolized vaccines. In those experiments, however, there was great variation in the dosage of nerve substance, the quantities being (for human beings) 6 to 8, 4, and 0·7 gm. respectively. It was realized that until the three methods were contrasted in uniform dosage no definite conclusion as to relative efficiency could be drawn. The present communication[21] by CUNNINGHAM, MALONE & CRAIGHEAD deals with certain aspects of this problem. Carbolized vaccines were given to 4,474 persons, and ether carbolized vaccines to 4,513 according to the alternate case system, and as a check 1,598 persons of the type of Hempt's Class III, were treated by Alivisatos' method. In each case the vaccine was a 5 per cent. emulsion of brain substance. The figures are given in detail, and the results have been examined for significant differences by MCKENDRICK (Appendix B). The general conclusion is arrived at that 5 per cent. carbolized and 5 per cent. Alivisatos' vaccines are similar and both superior to 5 per cent. etherized-carbolized vaccine. A large experiment was conducted upon animals. With regard to the method of preparation of the vaccine it appears that 5 per cent. Alivisatos' vaccine is superior to 5 per cent. etherized-carbolized vaccine and to no treatment, and that 5 per cent. carbolized vaccine takes a mid position between Alivisatos' vaccine and etherized-carbolized vaccine, though it is not significantly different from either. As regards strain of virus, Paris fixed virus is superior to Kasauli fixed virus. [These are in brief the general conclusions of an investigation which is an example of thoroughness and of patient labour. That the comparison of methods of treatment is a laborious business will be recognized by all who read this exhaustive memoir of 144 pages. It should be studied not only by those interested in rabies, but by those who are concerned with treatment by vaccines of any sort.]

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[20] SCHNEIDER (J. E.) & MCGROARTY (B. J.). Transmission of Experimental Rabies from Mother to Young.—*Jl. Amer. Vet. Med. Assoc.* 1933. Apr. Vol. 82. N.S. Vol. 35. No. 4. p. 627.

[21] CUNNINGHAM (J.), MALONE (R. H.) & CRAIGHEAD (A. C.). An Investigation into the Value of an Etherized Vaccine in the Prophylactic Treatment of Rabies. Part VIII. The Comparative Immunizing Value of Carbolized, Etherized-Carbolized and Etherized Vaccines Tested under Identical Conditions of Dosage and Administration.—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1933. Jan. Memoir No. 26. pp. vii + 144. With 1 chart.

The vaccines of Fermi and Philipps are compared by PALAWANDOW & SEREBRENNAJA (Odessa).[22] Because of the weak bactericidal power of glycerine, and its thick consistence, the preparation of Philipps' vaccine involves a loss of about 30 per cent. of material. Fermi's vaccine requires no dilutions once it is prepared, whereas Philipps' vaccine has to be diluted daily. The vaccine of Fermi is always sterile, whereas about 10 per cent. of Philipps' vaccine has to be discarded on account of bacterial contamination. The immunizing power of Fermi's vaccine is the higher, as also is the rabicidal power produced in the blood. The advantages which are possessed by Fermi's vaccine are probably due to the larger quantity of nerve substance which it contains, and also to the action of the phenol.

A third analytical review by MCKENDRICK[23] of statistics from Pasteur Institutes on the results of antirabic treatment undertaken by the Health Section of the League of Nations at the instance of the International Rabies Conference (Paris 1927) has appeared. It deals with the data relating to 69,541 treated persons, and relates mainly to the year 1930.

The figures under review again emphasize the fact that the non-European is at a much higher degree of risk than the European. The mortalities for the two race groups are in the ratio of 7·8 to 1.

No evidence has been found which suggests the existence of a superiority of any one method of treatment over any other, or, more generally, there is no evidence of the existence of a superiority of treatment by live vaccines over treatment by killed vaccines. With regard to this point the reader is referred to the following table which comprises such figures as it was possible to extract from the three reviews relating

Treatment	Number treated	Deaths		Mortality per cent.
		Observed	Calculated*	
Cords	1,784	5	3·4	0·28
Dilutions	4,731	7	9·1	0·15
Killed phenol	2,920	4	5·6	0·14
Live phenol	526	2	1·0	0·38
Heated	6,685	16	12·9	0·24
Ether killed	5,098	8	9·8	0·16
Mixed	5,338	10	10·3	0·19
Ether not killed ...	1,978	4	3·8	0·20
	29,060	56		0·19

* From the average mortality.

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[22] PALAWANDOW (Haidar) & SEREBRENNAJA (A. I.). Vergleichende experimentelle Untersuchungen ueber die Methoden von Fermi und Philipps.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 3/4. pp. 217–230. [13 refs.]

[23] MCKENDRICK (A. G.). A Third Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment.—*Quart. Bull. Health Organisation, League of Nations.* Geneva. 1932. Dec. Vol. 1. No. 4. pp. 725–755.

to persons of a single race type (European) who were bitten by animals which were certified to be rabid (Categories A and B).

The probability that equal or greater differences than those observed would be likely to occur in a population which was admittedly homogeneous is found to be 0·8 so that there is no evidence of heterogeneity in the statistics gathered over the whole period. If the mixed group and those treated by ether (not killed) vaccines be combined, as seems reasonable since in both groups the treatment of severe cases is by the method of Alivisatos, the figures are as follows: number treated 7,316; observed deaths 14; calculated deaths 14·1; mortality per cent. 0·19.

From the figures submitted it would appear that liability to accident varies significantly according to the method of treatment employed. The relative incidence from the figures collected since the inception of these reviews is given in Section XII. It appears that the liability to accident from live vaccines is greater than the liability from killed, and that the liability from killed vaccines is greater than the liability from heated.

The table referred to deals with the combined statistics covered by the three reviews and is as follows :—

Treatment	Number treated	Accidents	Proportion	Percentage
Cords	33,751	17	1 in 1,985	0·051
Dilutions	14,649	4	1 in 3,662	0·030
Killed phenol ...	59,911	5	1 in 11,982	0·0085
Live phenol	1,117	0	—	$<0{\cdot}09$
Heated	22,716	0	—	$<0{\cdot}004$
Ether killed	22,038	3	1 in 7,346	0·014
Mixed	13,088	4	1 in 3,272	0·031
Ether not killed ...	3,634	0	—	$<0{\cdot}028$
	170,904	33	1 in 5,179	0·019

If the last two groups be combined the figures are serially 16,722; 4; 1 in 4,180, and 0·024 per cent.

In the annual report of the Pasteur Institute at Kasauli (India), **Shortt**[24] reports that as a result of the series of experiments carried out by Cunningham and his co-workers, the vaccine now employed is, as before, that of Semple, but that the dosage has been largely increased in the case of the severely bitten. The dosage for the slightly bitten is 1,400 mgm. during 7 days, whilst for the severely bitten it has been increased to a maximum of 8,500 mgm. in 15 days. The figures are still experimental in the sense that Paris and Kasauli strains of fixed virus are compared, as are also vaccine from the sheep and from the rabbit. The combined results are as follows :—

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[24] Kasauli, Pasteur Institute of India: The Thirty-First Annual Report of the Director of the Institute for 1931. Part II (Scientific) [Shortt (H. E.), Director].—46 pp. Delhi: Govt. Printers.

	Cases	Deaths	Mortality per cent.
Europeans treated at Institute ...	314	0	0
Non-Europeans treated at Institute	7,389	95	1·29
Europeans treated outside	801	0	0
Non-Europeans treated outside ...	2,643	8	0·30

One rather doubtful case of post-vaccinial paralysis is reported. The percentage of health returns received after six months from the termination of treatment for those treated at the Institute is above 72 per cent., and for those treated at out-centres it is above 63 per cent.

At Coonoor[25] the dosage of carbolized vaccine has also been increased; in this case the variation is between 700 and 3,500 mgm. administered during 14 days. The results published by IYENGAR, are as follows:—

	Cases	Deaths	Mortality per cent.
Europeans at Institute	40	0	0
Non-Europeans at Institute	462	7	1·51
Europeans outside	236	2	0·75
Non-Europeans outside	7,790	58	0·74

No cases of post-vaccinial paralysis have occurred. The percentage of health returns received six months after the expiration of treatment is above 94 per cent.

The method of Semple is employed at the "Instituto Vital Brasil." The number treated is 544, and no deaths from rabies nor cases of post-vaccinial paralysis have been observed. BRASIL & LEAL[26] discuss the treatment of rabies generally.

VIALA[27] reports that during the year 1932, 561 persons were treated at the Pasteur Institute, Paris, and that none of these developed rabies. No post-vaccinial paralyses were observed.

vi. *Rabies in Animals.*

From experiments on 45 frogs (*Rana temporaria*) BATTAGLINO[28] confirms the observation of REMLINGER & BAILLY that the frog is refractory to rabic infection. The frogs were killed at intervals and their brains tested for virulence. In frogs which were in a state of lethargy, virulence was retained for a period of about 32 days, whereas when the frogs were active virulence was lost after about 3 days. The tests for virulence were carried out on guineapigs, which were more susceptible than rabbits. The virus recovered from the frog's brain had not become attenuated.

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[25] COONOOR, PASTEUR INSTITUTE OF SOUTHERN INDIA: Twenty-Fifth Report of the Director of the Institute for 1931 [IYENGAR (K. R. K.), Director]. —69 pp. Madras: Madras Publishing House.

[26] BRASIL (Vital), Jr. & LEAL (A. Estillac). Vaccinaçaõ anti-rabica pelo methodo de Semple.—*Brasil-Medico.* 1932. Nov. 5. Vol. 46. No. 45. pp. 931–933.

[27] VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1932.—*Ann. Inst. Pasteur.* 1933. May. Vol. 50. No. 5. pp. 745–748.

[28] BATTAGLINO (Giuseppe). Contributo allo studio del virus rabido nella rana.—*Giorn. di Batteriol. e Immunol.* 1932. Dec. Vol. 9. No. 6. pp. 961–971. English summary (5 lines).

Five more cases of rabies in the mongoose are reported by GREVAL[29] from India.

The statistics of post-infectional antirabic treatment of domestic animals in Hungary during the last thirty years are analysed by AUJESZKY.[30] In all 19,979 domestic animals have received treatment. The method employed is a modification of the dilution method of Högyes (eight inoculations during 6 to 9 days). Information regarding the fate of the animal was available in 19,583 cases. Of these 347 died during the course of treatment or during the succeeding 14 days ; of the remaining 19,236, 130 developed rabies (0·67 per cent.). Three cases of paralytic accident, none of which were fatal, were observed. Data are also given of the incubation periods observed in the different animals.

Statistics of preventive inoculation of animals furnished by BALOZET[31] from Tunis, show that of 482 dogs vaccinated prophylactically during the period 1st October 1931 to 31st December 1932, three developed rabies. These three had been bitten by a rabid dog a month or two before vaccination, and so cannot be considered as failures of prophylactic inoculation. The effect of the prophylactic measures is demonstrated by the following figures from the town of Bizerta. In 1931, 22 cases of rabies occurred. In the first quarter of 1932, 20 cases were reported. In the second quarter, that is 9 to 15 months after the administration of the vaccine, only one case of rabies was observed.

An " antirabic week " has been instituted in Japan[32] for the control of rabies in districts where the disease is present. During this period

Year	No. of rabid dogs	No. of dogs inoculated	No. of persons bitten	No. of deaths from rabies
1921	—	—	—	54
1922	—	—	—	79
1923	2,644	116,050	—	174
1924	3,205	194,177	—	235
1925	3,036	255,097	—	143
1926	1,799	234,680	—	80
1927	986	200,032	1,446	30
1928	434	225,636	1,122	22
1929	172	145,653	5*6	12
1930	65	128,753	267	4
1931	44	—	65	—
1932	63	—	—	—

* The figure between the 5 and 6 is illegible.

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[29] GREVAL (S. D. S.). Rabies in the Mongoose. Further Observations.—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 20–23.

[30] AUJESZKY (A.). Dreissig Jahre der postinfektionellen Wutschutzimpfung der Haustiere in Ungarn.—*Deut. Tierärzt. Woch.* 1933. Apr. 8 Vol. 41. No. 14. pp. 209–210.

[31] BALOZET (L.) La vaccination antirabique des animaux en Tunisie du 1er octobre 1931 au 31 décembre 1932.—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 538–543.

[32] JOURNAL OF THE PUBLIC HEALTH ASSOCIATION OF JAPAN. 1933. Apr. Vol. 9. No. 4. pp. 2–3.—Measures taken in Japan for the Prevention of Rabies.

all dogs are registered, unclaimed dogs are destroyed, preventive inoculation is given, etc. The results appear in the table (p. 585).

vii. *Post-Vaccinial Paralyses.*

Three cases of post-vaccinial paralysis amongst persons treated by Semple's carbolized vaccine are described by **Stuart** and **Krikorian**.[33] They occurred within the period April 28th to July 29th 1932, and two had a fatal termination. The occurrence of such accidents at Jerusalem has been as follows :—The first occurred after 4,580 bitten persons had been treated, the second after 5,409, and the fifth after 9,950. Again, "while the period 1923–7 was entirely free from accident, the period 1928–32 showed 5 cases of post-treatment paralyses." Of the five, three showed Landry's syndrome and ended fatally ; the other two were cases of dorso-myelitis and have recovered. "A parallel is found in the statistics of the Vienna Institute : whereas between 1894 and 1914, 7,632 bitten persons were treated without accident, between 1915 and 1923, 6,764 treatments yielded 39 cases (5·7 per thousand)." These periodic increases cannot be ascribed to intensification of treatment or be explained by the numbers of passages to which the fixed virus used has been submitted (Bujwid's theory). They lend support to the view that the incidence shows periodic increases. The histopathological appearances were those of varying degrees of degenerative change in the nerve cells, with considerable perivascular congestion. Perivascular demyelination and "cuffing" were absent. No Negri bodies were found. "A cytotoxin, rather than a virus theory of origin, is again advanced. Thus in the basic nerve substance of all antirabic vaccines there seems to exist some deleterious component which, though adversely affected by various physical and chemical agencies, is still capable, in peculiarly susceptible individuals, of producing neuroparalytic disorders."

viii. *Miscellaneous.*

From an experiment carried out on 12 guineapigs, three treated with fixed virus brain, three with normal brain, and three controls, **Dolfini**[34] comes to the conclusion that antirabic treatment (method of Puntoni) has no influence on the occurrence of characteristics of anaphylactic shock induced by horse serum. As antirabic vaccine is rich in lipoids, this result is considered to be of importance in relation to the view held by many, that anaphylactic shock is inhibited by the parenteral injection of lipoids.

In the second part of a memoir entitled "Studies in Rabies," **Remlinger** & **Bailly**[35] have collected a number of recent papers. In the first and second sections they describe the treatment of dogs and other animals by etherized virus, and give the results of their experience in Morocco. (This *Bulletin*, Vol. 30, p. 137 and earlier papers.) In the second they describe their experiments with the Trinidad virus

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[33] **Stuart** (G.) & **Krikorian** (K. S.). Neuroparalytic Accidents Complicating Antirabic Treatment.—*Brit. Med. Jl.* 1933. Mar. 25. pp. 501–504. [21 refs.]

[34] **Dolfini** (G.). Può la vaccinazione antirabica modificare uno stato di sensibilizzazione allergica ?—*Policlinico.* Sez. Prat. 1933. Feb. 20. Vol. 40. No. 8. pp. 285–287. [20 refs.]

[35] **Remlinger** (P.) & **Bailly** (J.). Etudes sur la rage (deuxième mémoire).—*Ann. Inst. Pasteur.* 1932. Dec. Vol. 49. No. 6. pp. 665–735. [Refs. in footnotes.]

(Vol. 29, p. 596). The third section deals with the effects of alcoholism during immunization (Vol. 30, p. 143). The fourth on phylaxis deals with the action of sparteine (Vol. 30, p. 140). The fifth on the persistence of rabies virus in the brain of the tortoise has already been reviewed (Vol. 29, p. 605 and Vol. 30, p. 141). The sixth is on the influence of cachexia on the pathogenesis of rabies (Vol. 29, p. 607). The seventh discusses the influence of anaesthesia on the incubation period of rabies (Vol. 29, p. 607). The eighth and last is on the passage of rabies virus through the milk (Vol. 30, p. 137). The results of these researches are thus already in the hands of the reader.

A. G. McKendrick.

TROPICAL DERMATOLOGY.

BRINDLEY (Paul) & HOWELL (W. L.). **Madura Foot in the United States.**—*Southern Med. Jl.* 1932. Oct. Vol. 25. No. 10. pp. 1022–1026. With 8 figs.

By 1921, 13 cases of mycetoma had been reported in the United States; since then 12 more have been described. To this list the author now adds three seen in Texas, two having occurred in Mexican women and one in a negro. After detailed notes of these three typical cases, the epidemiology of the whole 28 is studied. Six were seen in whites, 7 in negroes and 15 in Mexicans. Twenty-three were males, 19 were labourers and 16 gave a history of previous trauma. Nineteen occurred in the southern States, *i.e.*, in a semitropical climate. Six specimens in all have been examined by the authors, their clinical and histological appearances being described. *M. Sydney Thomson.*

TRAUT (Heinrich). Ueber Jodbehandlung bei Madurafuss. [**Treatment of Madura Foot by Iodine.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Mar. Vol. 37. No. 3. pp. 147–148.

A boy of 14 at Canton, China, after treading on a thorn developed a swollen foot with fistulae and discharge of yellow granules. The greater part of the phalanges and metatarsals came away. He was treated with a solution of 1 gm. Iod., 2 gm. K.I. with water to 300 cc. beginning with 0·5 cc. and rising by the same amount every 4–5 days to 5·0 cc. intravenously. He made a good recovery and was seen 1½ years later walking without a stick. The only drawback was the obliteration of veins after 3–4 injections. No bacteriological details.

A. G. B.

MONSERRAT (Carlos). **Pseudomycetoma in the Philippines, with Report of One Case.**—*Philippine Jl. Sci.* 1932. Nov. Vol. 49. No. 3. pp. 469–481. With 4 plates (1 coloured). [11 refs.]

The case occurred in a male Filipino, aged 28 years, who when first seen gave a history of nine years' duration. For the first five years a small elongated mass was present below the left external malleolus; this was freely movable on the underlying tissues and was not painful. Following a local wound four years ago, the mass rapidly enlarged and suppurated. Central healing was then followed by the appearance of small nodules in the neighbourhood, each of which ruptured in turn. This process gradually spread peripherally until, at the time of examination, most of the left foot was swollen and covered with multiple nodules, some hard and some exuding a thin discharge. Patches of scarring and hyperkeratosis were also present. The whole lower half of the leg was enlarged and the upper half atrophied. No granules were seen in the pus, but its inoculation on blood hormone agar resulted in the growth of a streptothrix. The morphological and biological characteristics of the organism are described in detail and appear to resemble those exhibited by *Streptothrix freeri*. *M. S. T.*

KITTREDGE (H. E.) **Trichophytosis, including Onychomycosis Universalis, simulating Tinea Imbricata. Report of an Unusually Extensive Case.**—*Arch. Dermat. & Syph.* 1933. Apr. Vol. 27 No. 4. pp. 607–623. With 6 figs. [68 refs.]

Describes in great detail a very chronic and very extensive case of ringworm, the patient being a white man, a native of Florida. Practically the whole of the body and all twenty nails were affected, the causative organism being *T. purpureum.* It is suggested that tinea imbricata is not an entity, but may be caused by different fungi, particularly in those cases where the ringlike configuration is entirely lost. " In a temperate climate like that of North America, an extensive trichophytic eruption of tropical origin may constitute a clinical analogue of the tinea imbricata of the tropics." *M. S. T.*

CATANEI (A.). Description de *Trichophyton gourvili* n. sp., agent d'une teigne de l'homme. [**Description of** *Trichophyton gourvili* **n. sp., found in a Case of Human Ringworm.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 377–381. With 1 plate.

During a study of ringworm of the scalp among children of Bamako (French West Africa), two examples of a new fungus were isolated. It is an endothrix and has been given the above name in honour of Dr. GOURVIL, one of the author's colleagues. The cultural and morphological characteristics, etc., are described in detail. *M. S. T.*

CONNOR (J. Ivan). **Favus in Mice and Men.**—*Med. Jl. Australia.* 1932. Dec. 24. 19th Year. Vol. 2. No. 26. pp. 765–767. With 4 figs.

Describes an outbreak in the wheat-growing areas of Victoria and New South Wales. Infected mice were obtained from the wheat stacks near Melbourne and proved to be carriers of *Achorion quinckeanum.* The same fungus was grown from infected patients, who, however, comprised only a small proportion of the total number of men exposed. In these cases scutula were rare, erythematous rings being present on the glabrous skin and kerion-like lesions on the scalp.

M. S. T.

CHAVARRÍA (Peña) & ROTTER (Werner). Die kolumbianische Piedra. [**Piedra in Colombia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Feb. Vol. 37. No. 2. pp. 73–87. With 16 figs. [17 refs.]

An investigation based on twelve cases, from every one of which there was isolated not only *Trichosporon giganteum* but also *T. Hortai.* Experimental efforts to inoculate the disease into mice, rats, dogs, guineapigs and apes were all unsuccessful. Nevertheless the authors believe that *T. Hortai* is really the responsible agent because *T. giganteum* is widespread and is found in cases of pityriasis in countries where piedra is unknown and also because cultures of *T. Hortai* correspond in colour and shape with the appearances presented by the hair nodes.

The cultural characteristics of the fungus are discussed and it is claimed that six specimens obtained from Brazilian and Paraguayan cases presented the same features. *M. S. T.*

PUNTONI (V.) & PAMPANA (E. J.). *Trichophyton megnini, seu rosaceum,* in un caso di caraté bruno-rameico della Colombia. [***Trichophyton megnini* seu *rosaceum* isolated from a Case of Pinta.**]—*Ann. d'Igiene.* 1932. June. Vol. 42. No. 6. pp. 378–384. [15 refs.]

The patient, a Colombian negro, of 22 years, showed a condition of pinta, which started at the fold of the left elbow 11 years ago and now was present on both arms and on the trunk, back and front. He had had yaws at the age of 13 years. The Kahn reaction gave ++++. Treatment by salicylic acid ointment and by injections of neosalvarsan was ineffectual.

The main interest lies in the isolation on Sabouraud's medium of a fungus giving at first a velvety white growth whose surface later acquired a red tint. This was subcultured and identified as *T. megnini* Blanchard 1895 (*T. rosaceum* Sabouraud 1909). Other fragments produced sparse colonies of *Aspergillus cinerescens,* "a transition form between *A. fumigatus* and *A. glaucus.*" The Trichophyton greatly preponderated and the authors regard it as the cause of pinta in Colombia. *H. H. S.*

CATANEI (A.). Recherches sur les trichophyties cutanées obtenues chez le cobaye après introduction dans l'organisme de cultures de *Trichophyton.* [**Ringworm in the Guineapig after Inoculation with a Trichophyton.**]—*Arch. Inst. Pasteur d'Algérie.* 1932. June. Vol. 10. No. 2. pp. 195–203.

During these experiments cultures of *T. radiolatum* were used, whilst selection of the animals, sterilization of the cages, etc., were carefully controlled throughout. The cultures were introduced either by the mouth, or by subcutaneous, intraperitoneal or intravenous injection; after which a small area on the back was scarified. Three series of experiments were carried out with each type of inoculation. Subcutaneous and intraperitoneal injections gave only 2 positive results in 22 experiments. Oral ingestion and intravenous injection always resulted in the rapid appearance of infection at the site of scarification. Local contamination by infected faeces is probably the most important factor governing the positive results in the first group. *M. S. T.*

WILSON (Sidney J.), HULSEY (Sim) & WEIDMAN (Fred D.). **Chromoblastomycosis in Texas.**—*Arch. Dermat. & Syph.* 1933. Jan. Vol. 27. No. 1. pp. 107–120. With 5 figs. [10 refs.]

Describes a case of extensive verrucous disease of one leg, of forty years duration and due to *Phialophora verrucosa.*

It occurred in a white male, resident all his life in Texas. Clinically it was typical. Histologically it resembled Gilchrist's blastomycosis except that the organisms are deep brown in colour and show no budding.

The causative fungus was isolated and injected into rats. These experiments proved its low virulence, for whilst it always caused granulomata at the sites of injection, the lesions always remained localized. This corresponds to the clinical aspects in that the internal organs always seem to escape infection in chromoblastomycosis, whereas metastases are common in Gilchrist's disease. It is also suggested that Kaposi's sarcoma might be regarded as a mycid with an internal primary focus, this possibility being based on the findings in a necropsy, to which, however, only passing reference is made. *M. S. T.*

ROTTER (Werner) & CHAVARRÍA (Peña). Untersuchungen ueber Blastomykosen in Costa Rica. [**Investigations of Blastomycosis in Costa Rica.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Jan. Vol. 37. No. 1. pp. 1–10. With 14 figs.

Describes in detail a case of chromoblastomycosis, which corresponds exactly to that reported in the same area by NAUCK in 1931 [this *Bulletin*, Vol. 29, p. 276]. This is followed by a description of four other cases of the type known in South America as Espundia. The histological pictures presented by these diseases and by " mossy foot," are discussed from the point of view of their differential diagnosis. Both the clinical and the microscopical photographs are excellent.

M. S. T.

BONNE (C.). **A Few Remarks on Two Rare Parasitic Diseases in the Malayan Archipelago. A. Chromoblastomycosis. B. Sparganosis.**—Reprinted from *Far Eastern Assoc. Trop. Med. Trans. Eighth Congress, Bangkok, 1930. Dec.* pp. 184–187. With 4 figs. on 2 plates.

Chromoblastomycosis. Describes a case seen in Batavia in 1927, the disease having started on the dorsum of the left foot seven years before. Both clinical and histological pictures were typical of chromoblastomycosis, whilst inoculation on Sabouraud-agar yielded an abundant growth of a fungus with yellowish spores. The Malayan native had acquired the infection in Sumatra, and reference is made to a second case from that area, described by KWANEGEN and ELTE in 1930. *M. S. T.*

i. BONNE (C.). Over een tweeden vorm van huidblastomycose in den Indischen Archipel. [**A Second Form of Blastomycosis of the Skin in the Indian Archipelago.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Dec. 15. Vol. 71. No. 18. pp. 1502–1509. [1 ref.] English summary.

ii. ——. Over het begrip Blastomycose.—*Ibid.* pp. 1509–1512. With 5 figs. on 2 plates. English summary.

i. " Besides chromoblastomycosis, previously described by the author from Java and Sumatra [see this *Bulletin*, Vol. 26, p. 762; Vol. 28, 405], a second form of blastomycosis of the skin, resembling the Gilchrist type is here reported. It does not seem to be rare at all, but its histological diagnosis is difficult on account of the scarcity of the organisms and their indifferent staining reactions.

" The disease attacks various parts of the body: back, legs, buttocks; it is characterised by acanthosis, dermal infiltration with round cells and eosinophils and the formation of miliary or larger abscesses and fistulae. Blastomycetes are present in the pus, usually in scanty numbers. Budding and dividing forms can be observed. Sometimes they occur in small groups of three or four. Their usual size is 4–10 μ, seldom larger. Probably very small intracellular forms of 1–2 μ or smaller also exist. They stain with haematoxylin the same way as the nuclei of cells and only in favourable positions they can with certainty be recognized from pycnotic nuclei of tissue cells or leucocytes. The center of the parasite usually remains unstained but the perifery presents itself as a more or less darkly stained crescent or rim.

ii. " The term blastomycosis can only have a definite meaning when we understand it as a pathological condition caused by the blastomycetes. But in many forms of blastomycosis one does not succeed in reproducing the disease in animals by inoculations of the cultures obtained. On the other hand saprophytic yeasts are extremely common on skin and mucous membranes. And so little is known about the systematic position of the various parasitic and saprophytic blastomycetes that it is often rather dangerous to found a diagnosis of blastomycosis only on a positive culture or pus-preparation. A histological study of the tissues gives more certainty, when a definite tissue reaction is visible. But one should always keep in mind the possibility, that the invasion by blastomycetes and the tissue reaction caused by their presence may be secondary processes in already diseased organs. However, as long as there are no indications of the existence of another primary disease, the simplest way is to consider the blastomycetes as the primary aetiological agents. In leprosy, *e.g.*, we meet similar unsatisfactory experimental results, but still we accept the bacilli as the cause of leprosy.

" The term ' blastomycetes ' is used in medicine in a very general way, quite different from the interpretation of this word in botany. In the future it will be gradually replaced by more accurate systematic botanic names." *A. G. B.*

VASUDEVAN (A.). **An Unusual Type of Parasitic Infection of Forearm.** —*Indian Jl. Med. Res.* 1932. July. Vol. 20. No. 1. pp. 299–302. With 6 figs. on 1 plate.

The findings in a portion of tissue from a lesion in the forearm received from Ceylon ; no history was obtained. A parasite is described resembling in some respects *Rhinosporidium seeberi* but considered to be a protozoon. It is illustrated in six figures. *A. G. B.*

HURI. Sur une forme de pyodermite : Pyodermite extensive à Staphylocoque. Son traitement par la méthode de Besredka. [**A Type of Pyogenic Dermatitis due to Staphylococcal Infection.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 573–576.

An account of cases seen in Syria only during the hot season. Itching of the exposed parts of the body is rapidly followed by the appearance of tiny pustules, which quickly become confluent. Cultures taken from these lesions grow large numbers of *St. aureus*. After about a week the pustules become covered by fragile scabs which break to allow the escape of blood and pus. Five to eight days later these crusts fall off and a fresh crop of pustules appears. These relapses gradually result in more and more involvement of the skin. There is never any systemic disturbance, although the disease persists throughout the whole of the season. All treatments failed to effect a cure until Besredka's local antivirus method was used. *M. S. T.*

HASSARD (E. N.). **" Prickly Heat," by a Sufferer.** [Correspondence.] —*Jl. Trop. Med. & Hyg.* 1932. Sept. 15. Vol. 35. No. 18. p. 288.

The writer's directions are as follows :—Take a piece of old linen or rag, wet it with perchloride of mercury solution 1/1,000 direct from the bottle's mouth, dab the prickly heat with the wet linen and let the solution dry off without wiping. This should be repeated several times a day and will effect a cure. In the case of a baby the perchloride should be diluted with half of water. [It would be risky to use such a solution over a large area of skin.] *A. G. B.*

CORKILL (N. L.) & SCANDER (Daoud). **A Condition Superficially resembling Mossy Foot, in a Native of the Sudan.**—*Ann. Trop. Med. & Parasit.* 1932. Oct. 29. Vol. 26. No. 3. pp. 267–272. With 2 figs. on 1 plate.

A male Nuba, aged about 40, presented a lesion of the left foot which had started thirty years earlier as an ulcer on the anterior surface of the leg, immediately above the ankle joint. This apparently healed at times but frequently relapsed until fifteen years ago when it was noticed that the lower edge had become thickened and tough. Since then persistent spread has led to a deep indolent ulcer covering the lower third of the leg and the upper half of the dorsum of the foot, with exposure of the tibia. The remainder of the foot was grossly enlarged and bore bosses of various sizes. The skin was papillomatous except for the areas where the sole touched the ground. General examination revealed clubbing of the fingers and some splenic enlargement. Amputation was performed and microscopy showed a granulomatous condition with a very excessive deposit of fibrous tissue. No organism of any kind was discovered by staining methods, whilst cultures grew only a few colonies of *Staphylococcus aureus*. Whilst the general appearances were those of mycetoma, yet no sinuses, no granules, no involvement of bones or tendons and no oedema of the tissues were present. *M. S. T.*

FLEMING (A. McK.) & HENNESSEY (R. S. F.). **A Dermatosis occurring among East African Natives.**—*Brit Jl. Dermat. & Syph.* 1932. Apr. Vol. 44. No. 4. pp. 173–181. With 7 figs.

A description of six cases seen in Uganda within a period of twelve months. All occurred in natives, the past histories therefore being unreliable ; yet an average duration of two years before treatment would seem to be established. Examination revealed a patchy, coarse thickening of the skin, each plaque showing superimposed papules with some excoriation and secondary infection. The distribution is usually most pronounced on those parts of the body exposed to irritation and friction. Each patch " felt like a piece of soft but fairly thick leather." The papules were smooth, rounded, deep and varied from 1 to 5 mm. in diameter. Small, hard glands were palpable in a few areas only. Physical examinations were otherwise negative, but all cases had an eosinophilia of 20 to 50 per cent. The lesions themselves consisted of a fibrosis extending deeply into the corium, with areas of lymphocytic and eosinophilic infiltration. An axillary gland also showed a similar infiltration. All other pathological investigations proved negative. Treatment has so far relieved the irritation only. *M. S. T.*

Bloom (David) & **Newman** (Ben). Ainhum: Report of a Case with Roentgenologic Findings and Review of Literature.—*Arch. Dermat. & Syph.* 1933. May. Vol. 27. No. 5. pp. 783–793. With 3 figs. [31 refs.]

Croveri (Paolo) & **Borsotti** (P. C.). Su di un caso di micosi della guancia da *Penicillium crustaceum.*—*Arch. Ital. Sci. Med. Colon.* 1932. Nov. 1. Vol. 13. No. 11. pp. 665–676. With 5 figs. English summary (4 lines).

Fitzgerald (G. H.). A Mycetoma-like Condition of the Foot.—*Indian Med. Gaz.* 1932. Sept. Vol. 67. No. 9. pp. 517–518. With 1 fig.

Fróes (Heitor P.). Ueber die Ätiologie der Dermatitis linearis serpiginosa (Hautmaulwurf) in Brasilien.—*Dermat. Woch.* 1933. May 13. Vol. 96. No. 19. pp. 662–663.

Stein (Robert Otto). Ueber die Behandlung von Narben und Keloiden.—*Mitt. d. Volksgsndhtsamt.* Vienna. 1933. Jan. 1. No. 1. pp. 12–14.

YAWS AND SYPHILIS.

SCOTT (C. Justin). **Yaws.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1933. Feb. Vol. 12. No. 139. Special Supplement pp. 41–70. With 35 figs. [51 refs.]

After giving a general account of yaws gleaned from the writings of others, Dr. Scott deals with an outbreak of the disease among natives employed in one of the Rand mines near Johannesburg.

In January 1931 the author in conjunction with Dr. DANIEL found that yaws was prevalent among the natives working in the Turf mine. On enquiry it was discovered that occasional cases of yaws had been diagnosed by the M.O. in charge during the years 1915–1925. Between 1925 and 1931 with a change in the M.O. these cases were diagnosed and treated as syphilis. In 1930, 78 cases had been so diagnosed. In 1931 the incidence was as follows:—Jan. 11; Feb. 18; Mar. 16; Apr. 26; May 22; June 23; July 23; Aug. 25; Sept. 33; Oct. 57; Nov. 48; Dec. 36.

An attempt to discover the factors leading to the outbreak was unsuccessful. Yaws appeared to have been present among the Turf shaft natives for at least 15 years but had not spread to neighbouring mines; then in 1931 this outbreak occurred, still without spread to other mines. Though the various groups of natives lived together in their compounds no case occurred among 1,000 "surface" natives, and only 2 per thousand among 4,000 working down the Chris shaft, while 84 per thousand of the "boys" working in the Turf shaft were affected. This fact seemed to point to infection taking place in the Turf shaft, a conclusion further supported by finding that 7 white miners of this shaft had contracted yaws in the previous eighteen months. Two or three points are worthy of note. The primary lesion occurred on every part of the body except the foot and ankle—a fact explained by the fact that the boys wear boots. Whereas Johannesburg is about 6,000 feet altitude and the temperature in the native compounds below zero at night in the winter months, the workings are 1,000–2,000 feet below sea level with a temperature from 87°F. wet and 88°F. dry bulb to 91°F. wet and 92°F. dry. The results of treatment—various combinations of neosalvarsan and bismuth—are dealt with very fully and do not lend themselves to being summarized. It was considered that 4 intravenous injections of 0·45 Neo combined with the same number of intramuscular injections of 3 grains Bis. sod. tart. at 3 days' interval gave the best results. Of 61 cases 6 passed out of observation 2–3 months after treatment, all had negative W.R. and no recurrence; 23 had had no recurrence in 3 to 9 months' observation, 32 no recurrence after 9 months' observation. With other methods a recurrence rate of from 17 to 70 per cent. was seen.

[It would have been interesting to have observations upon the differential diagnosis with syphilis and also to have heard whether lesions on mucous membranes did or did not occur.]

H. S. Stannus.

D'SOUZA (A. J.). **Yaws in the Nicobar Islands.**—*Indian Med. Gaz.* 1933. Mar. Vol. 68. No. 3. pp. 155–159.

It had been reported in the past that syphilis was very prevalent in the Nicobars. A recent investigation, however, has shown that very few cases of syphilis occur and these have acquired their infection at trading centres in touch with the outer world. On the other hand yaws was discovered to be not uncommon, chiefly among young adults, and presented the usual picture of the disease, including the occurrence of gangosa and juxta-articular nodules. *H. S. S.*

MATTLET (G.). Note au sujet de l'hérédité du pian. [**Heredity in Yaws.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. **13.** No. 1. pp. 13–15.

The W.R. Hecht and Meinicke tests on the blood of a 10-day-old infant, the child of a mother presenting a florid yaws eruption and herself W.R. Hecht and Meinicke positive, were all negative. The author had waited a number of years to get this opportunity. His opinion is that the placenta bars the passage of *T. pertenue* and maternal antibodies to the foetus.

He finds that in Ruanda-Urundi, where yaws is extremely widespread, it plays no part in causing a low birth rate or in causing abortions or a high infant mortality. *H. S. S.*

MONTEL (R.) & COUPUT (A.). Lésions ostéo-périostiques tertiaires dans le pian. Aspect radiologique. [**Tertiary Lesions of Bone in Yaws. Radiology.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1032–1036. With 14 figs. on 4 plates. [11 refs.]

The authors deal with the bony lesions met with in yaws as seen in patients at the Municipal Polyclinic of Saigon, Cochinchina.

The changes are of the nature of a rarefying osteitis, osteo-periostitis with hyperostitis and gumma formations. The evolution of the processses is slow and accompanied by osteocopic pain. Fistula-formation, extensive ulceration with elephantoid changes, arthritis and ankylosis commonly follow. The bones most commonly attacked are those of the limbs but the clavicle, ribs, vertebrae and in fact any bone may be involved. Some 10–20 per cent. of their yaws cases showed bone lesions ; they occurred chiefly in children and adolescents and the incidence is greatest among the ill-fed. Among observations extending over 30 years and many thousands of cases no case of goundou was seen and only one case of gangosa—a fact for which no explanation is forthcoming.

The authors believe that the proliferation of the periosteum and thickening of the external zone of the bone characteristic of syphilis is not seen in framboesial lesions, whereas the lesions which are so extensive, so widespread, and so generalized in yaws are never so diffuse in syphilis. *H. S. S.*

GARCIA (Onofre). **Serologic Study of Cerebrospinal Fluids in Philippine Monkeys inoculated with Yaws, Syphilis, or Both.**—*Philippine Jl. Sci.* 1933. Feb. Vol. 50. No. 2. pp. 199–203.

Sera and cerebrospinal fluids from 35 monkeys which had been infected with yaws or syphilis or both by SCHÖBL seven months to four years previously were examined, there being at the time no manifestations of disease.

The Wassermann and Kahn tests were uniformly negative in the C.S.F. but late positive serologic response was found in the blood serum of most of the animals. *H. S. S.*

Montel (R). Nodosités juxta-articulaires (A propos d'une communication de MM Fontoynont, G Girard et H Woltz sur une nouvelle conception des "nodosités juxta-articulaires" des Malgaches) [**Juxta-Articular Nodules.**]—*Bull. Soc Path Exot* 1933 Mar 8 Vol 26 No 3 pp 458–460 With 2 figs

Attention is drawn to the confusion which is likely to arise if the term J A N be applied to conditions other than that defined by Jeanselme under that name

The author criticizes on this account the article by Fontoynont, Girard and Woltz [see this *Bulletin*, Vol 28, p 935] in which they described generalized subcutaneous nodules containing uric acid and cholesterin and obviously of the nature of tophi in natives of Madagascar He also points out that the consideration together of J A N and rheumatic nodes by Mathieu-Pierre Weill and Delarue (3rd Internat Congress on Rheumatism) and by Crouzon and Gaucher (*Monde Méd* 1932 Nov 12) is unwarranted *H S S*

Blacklock (D B) **Relationship of Syphilis and Yaws.**—*Brit Med Jl* 1933 Jan 21 pp 97–98

This article covers much the same ground as one by the same author already noticed in this *Bulletin* [*ante*, p 185] *H S S*

CLIMATIC BUBO AND LYMPHOGRANULOMA INGUINALE

Stannus (H S) **The History of the Recognition of a New Venereal Disease, comprising Climatic Bubo, Lymphogranuloma Inguinale, Esthiomène, Chronic Elephantiasis and Ulceration of the Vulva, the Genito-Ano-Rectal Syndrome, Inflammatory Stricture of the Rectum.**—*Proc Roy Soc Med* 1932 Nov Vol 26 No 1 pp 7–15 (Sect of Trop Dis & Parasit pp 1–9)

Most tropical practitioners must be familiar with climatic bubo but few perhaps have had access to the literature dealing with an identical condition occurring in Europe, the United States and other temperate countries commonly referred to as lymphogranuloma inguinale, after Durand, Nicolas & Favre, who described the affection in Lyons in 1913 In his presidential address, Section of Tropical Diseases and Parasitology, Royal Society of Medicine, the author dealt with the history of these two conditions from the earlier records down to the time of their recognition as a single clinical entity with similar antigenic skin reactions, and to the present time when the proof of their identity has been established by the recovery from both of an ultra-microscopic virus with identical reactions in experimental animals Some account, brief perforce, was given of the symptomatology and pathology, the method of performing the intra-cuti-reaction of Frei, etc The results of later researches were then alluded to, which go to show that a number of rather rare conditions—chronic elephantiasis and ulceration of the vulva, esthiomène, "lupus vulvae," and what has been called inflammatory stricture of the rectum (a condition largely restricted to the female sex) are all due to an infection with the same virus

The conditions are to be found not only in Europe and America but also among native races of Africa and the East, though rarely recorded. In the past many diseases such as syphilis, gonorrhoea, chancroid and tuberculosis have been put forward as etiological factors in these conditions but without any satisfactory evidence to that effect. Many more observations among native races are wanted to fill up the gaps in our knowledge of this venereal disease, which should have for the clinician a fresh interest in view of the light thrown upon its nature by recent research. The paper itself is in the nature of a summary but it is hoped that a full survey of the whole subject may soon be available.

H. S. Stannus.

STANNUS (Hugh S.). **Lymphogranuloma (Poradenitis) Inguinale: Infection acquired in England.** With a Note on the Pathological Findings by G. Marshall FINDLAY.—*Lancet.* 1933. Feb. 18. pp. 358–359. With 1 text fig.

The history of the first proved case of L.I. whose infection was acquired in this country.

The diagnosis was confirmed by animal inoculation. Infection was acquired from an English girl in Soho. In his paper, above reviewed, Stannus maintained that, contrary to the general opinion expressed in the discussion, the disease was surely present in Great Britain as in Germany, France and elsewhere, but that it was possibly passing unrecognized. By a strange coincidence this case came under his care in hospital just at the time that paper was read. *H. S. S.*

v. VERESS (Franz). Beiträge zum gehäuften Vorkommen der Lymphogranulomatosis inguinalis und deren Behandlung. [**Increased Occurrence of L.I. (in Rumania): its Treatment.**]—*Dermat. Woch.* 1933. Feb. 11. Vol. 96. No. 6. pp. 201–203.

In the town of Klausenburg (Rumania) during the past few years cases of L.I. have been increasing in numbers. A many sided form of treatment is advocated.

Whereas the author only recollects having seen during the earlier part of this century two probable cases of L.I., the total number coming under observation during the last four or five years in three clinics in Klausenburg is about one hundred and fifty, half this number being among students between 20 and 30 years of age. In regard to treatment generous diet, abundance of vitamins and tonics are needed. Injections of small doses of proteins at frequent intervals are useful. Local exposures to weak X rays 2X with 2/3 mm. aluminium filter reaching an E.D. in 8–10 days, then repeated after an interval of a month. Galvanopuncture of areas of softening and 10–15 minutes daily Bier's hyperaemic treatment. Fistulous tracks are touched with carbolic and trypaflavine gauze drains inserted. Complete healing obtained in 4–8 weeks. *H. S. S.*

POLAK (H. J.). Lymphogranulomatosis inguinalis und Urethritis non specifica. [**L.I. and Non-Specific Urethritis.**]—*Dermat. Woch.* 1933. Feb. 18. Vol. 96. No. 7. pp. 233–235.

. The author admits the identity of climatic bubo and lymphogranuloma inguinale. Many cases were seen in Java.

He lays stress on the importance of recognizing a non-specific [*i.e.*, a non-gonorrhoeal] urethritis as the initial symptom. The primary lesion may lie within the urethra and give rise to a urethral discharge. In uncomplicated cases the discharge is abacterial. The bubo appears some weeks later. In some cases it is possible that the adenopathy may be minimal. Three cases are cited in which the urethritis as well as the bubo cleared up under treatment with neostibosan. All cases of " non-specific " urethritis should be subjected to a Frei skin test before the appearance of a bubo and patients submitted to treatment early.

H. S. S.

MEYER (Edda). Ein Fall von endemischem (?) klimatischen Bubo.—[**A Case of Endemic (?) Climatic Bubo.**]—*Dermat. Woch.* 1932. Dec. 29. Vol. 95. No. 52. pp. 1864–1867. With 1 fig.

A typical case of L.I. from Delbanco's clinic, Hamburg, in which it is *suggested* that the patient, a 30-year-old woman, *may* have been infected by the man who lived with her, he in turn by a prostitute who acquired her disease from a sailor who contracted C.B. in a foreign country.

The woman exhibited bilateral bubo of two weeks' standing; seven months before she had had an abscess in Douglas' pouch evacuated by vaginal incision. The adnexa were fixed but no thickening remained; there were no lesions in the vagina or vulva; no evidence of tuberculosis or syphilis. She gave a positive skin reaction with an L.I. antigen supplied by FREI and an antigen prepared from her own bubo gave a positive reaction in a case of C.B. infected in the tropics. Her male companion was said to be healthy but no mention is made of any skin test performed in his case.

[There is no evidence to suggest that the infection was due to a tropical strain of virus save the fact that it occurred in Hamburg.]

H. S. S.

FREI (W.). Der gegenwärtige Stand der Kenntnisse von der Elephantiasis genito-anorectalis (Esthiomène, entzündliche Rektumstriktur). [**Present State of Knowledge of Genito-Anorectal Syndrome.**]—*Deut. Med. Woch.* 1933. Dec. 9. Vol. 58. No. 50. pp. 1964–1966.

After mentioning something of the history of the recognition of the genito-ano-rectal syndrome as a result of L.I. virus infection and making allusion to the fact that the syndrome is often incomplete with the production of elephantiasis alone or rectal stricture unassociated with other lesions, Frei refers to those more abortive forms which may be easily missed such as a single chronic ulcer in the anal region or a condition of elephantiasis limited to the external opening of the female urethra.

In about 80–85 per cent. of collected cases of this syndrome Frei's cuti-reaction using an L.I. antigen has been positive. Whether among the 15–20 per cent. negatives some other cause has been at work Frei will not venture an opinion; the negative is of no more value than the 20 per cent. of cases of tabes which give a negative W.R. He thinks that the animal experimental work in connexion with the genito-rectal manifestations all points to a causal association of L.I. virus with the conditions but still hesitates to accept them as part of one disease. The positive skin reactions given by L.I. patients infected with material from cases of elephantiasis or rectal stricture he terms pseudo-reactions. In regard to the histological picture too, he is in doubt whether the tissue reaction is truly a reaction to a virus which is present or more of the nature of a reaction in a sensitized tissue excited by a non-specific antigen. *H. S. S.*

JERSILD (O). Elephantiasis genito-anorectalis. [**Genito-Anorectal Elephantiasis.**]—*Dermat. Woch.* 1933. Mar. 31. Vol. 96. No. 13. pp. 433–438.

Jersild has investigated 12 cases of the genito-ano-rectal syndrome which he divides into : *A*. 5 cases of syphilome ano-rectal, cases with peri-rectal and peri-anal infiltration stricture and fistula but no genital changes : *B*. 6 cases of elephantiasis genito-anorectalis, cases as in A. but combined with genital elephantiasis : *C*. 1 case of esthiomène (Huguier), vulval elephantiasis without involvement of the anus and rectum but with a stricture of the vagina 6 cm. above the hymen and stricture of the urethra.

In all the W.R. was negative. 8 of the total were [nevertheless] syphilitic but in 4 of these it could be proved that the rectal symptoms had preceded the syphilitic infection by 3 to 10 years. In two-thirds of the cases therefore syphilis could be excluded as a cause. In three cases the gonococcal complement fixation test was done, in 2 it was negative, in 1 doubtful. Examinations for gonococci were negative in all. The Dmelcos test was performed in 11 cases ; in 8 it was negative, in 1 doubtful, in 2 positive. The Frei intradermo-reaction with L.I. antigen was positive in 11 out of the 12. In the remaining case, one presenting the complete syndrome and the scars of previous inguinal buboes, the reaction was doubtful with one antigen and negative with another. An antigen prepared from pus obtained by expression of a para-rectal abscess in this case gave a positive skin test in a number of L.I. patients and negative results in controls. Similar cases have been reported by NICOLAS and by FREI but the value of this reaction is considered doubtful by FREI. The husbands of three of Jersild's cases, all of whom had had inguinal buboes, were submitted to Frei's test ; all were positive, Dmelcos test negative.

Jersild supports FREI in believing that these cases of the genito-ano-rectal syndrome are of L.I. origin. The few cases which do not give a positive L.I. skin reaction might be explained in several ways. RAVAUT has shown in 2 Frei skin reaction negative cases that the haemo-reaction by intravenous injection of antigen was positive.

Jersild like FREI is very cautious in regarding all cases as of L.I. aetiology and in regard to the evidence afforded by the pathological changes thinks that he has found only the picture of chronic inflammation in contra-distinction to BARTHELS and BIBERSTEIN, NICOLAS, FAVRE, MASSIA and LEBEUF who believe the changes are specific in character. *H. S. S.*

STRAUSS (H.). Zur Frage der Ätiol edogier " venerischen " Rektalstrikturen. [**Aetiology of Venereal Rectal Stricture.**]—*Dermat. Woch.* 1933. Feb. 18. Vol. 96. No. 7. pp. 235–238. [14 refs.]

A short general recapitulation of some of the evidence in favour of believing that so-called inflammatory stricture of the rectum is caused by an infection with the virus of L.I.

The author thinks that associated infections with other venereal diseases may play a part. The results of other observers using Frei's test upon cases of rectal stricture are quoted showing the overwhelming majority of positives. The few negative results the author believes are due to the use of an unsuitable antigen. *H. S. S.*

KALZ (Friedrich). Rekonvaleszentenserum bei Lymphogranuloma inguinale. [**Convalescent Serum in L.I.**]—*Dermat. Woch.* 1932. Dec. 17. Vol. 95. No. 51. pp. 1839–1842.

Dissatisfied with the results of treatment by stibenyl, fouadin, neostibosan, solganal B in watery solution, and rays, also intraglandular injections of serum, of glycerine, radio-active solutions, etc., the author treated 4 cases by means of intramuscular injections of serum from convalescent L.I. patients in 5 cc. doses. They were all early cases. In one thirteen injections were given in seventeen days with a total of 65 cc.; no softening occurred and the swelling diminished much in size. In another case 77 cc. were given in 15 days after aspirating a softened gland. No fistulae formed, fluctuation and inflammation disappeared by end of second week. In a third case in which the iliac glands were also enlarged 25 days treatment with 104 cc. serum brought about good results. *H. S. S.*

LEVADITI (C.), RAVAUT (P.), SCHOEN (R.) & LEVADITI (J.). Le phénomène des " neuro-infections mortelles autostérilisables " chez les singes inoculés avec le virus de la maladie de Nicolas et Favre. [**Fatal Self-sterilizing Neuro-Infections in Monkey inoculated with L.I. Virus.**]—*C. R. Soc. Biol.* 1933. Feb. 3. Vol. 112. No. 4. pp. 359–363.

It has been shown that in the case of many neurotropic viruses, death may occur with frank signs of reaction to the virus infection, at the moment when sterilization of the tissue in regard to the virus has been effected.

The present communication records the same phenomena in the case of monkeys infected with the virus of L.I. and thus is explained the failure to infect monkeys by means of brain emulsions of other monkeys which exhibit typical pathological changes of infection. This interruption in the passage of the infection from monkey to monkey may be remedied by passage to mice in whom the virus may persist without symptoms of infection up to 87–108 days. *H. S. S.*

COHN (A.) & KLEEBERG (L.). Zur Lymphogranuloma inguinale-Infektion des Affen. [**L.I. Infection in the Monkey.**]—*Dermat. Woch.* 1933. Mar. 11. Vol. 96. No. 10. pp. 342–343.

Intraperitoneal injection of L.I. virus in monkeys causes no evidence of meningo-encephalitis on histological examination.

Monkeys were injected intraperitoneally with 4 cc. of L.I. gland pus. On the sixth day they were killed, having shown no symptoms and emulsions were made of portions of omentum and meninges. These after sterility tests, etc., were used as antigens and Frei's test was made in three patients suffering from L.I. and 8 controls. In 6 of the 8 controls the result was negative, in 1 there was slight reddening of the skin, in another an infiltration the size of a pin head. The antigen prepared from the omentum gave rise to a definite infiltration in all cases. The meningeal antigen caused in one case a small papule, in the second a just visible papule, and in the third a definite infiltration.

The authors believe these results prove the presence of virus in the meninges. [The statements as they stand should be received with reserve.] *H. S. S.*

LEVADITI (C.), RAVAUT (P.), VAISMAN (A.) & SCHOEN (R.). Réceptivité du chat à l'égard du virus lymphogranulomateux. Neuro-infection autostérilisable. **[Susceptibility of the Cat to L.I. Virus.]** —*C. R. Soc. Biol.* 1933. Jan. 13. Vol. 112. No. 1. pp. 48–50.

Continuing some experiments already referred to in this *Bulletin* [*ante* p. 128], Levaditi and his colleagues have obtained some degree of success in passaging the virus of L.I. in cats.

A brain emulsion from a Cynocephalus baboon at the 38th passage, "Kamm strain," was introduced intracerebrally into a cat. The animal developed symptoms on the 12th day and died the following day. On examination the brain was sterile to culture but exhibited the typical changes of a L.I. infection. Brain fragments from this case after 4 days in the ice-chest were emulsified and inoculated intracerebrally into a second cat. This animal died on the 9th day and showed at autopsy similar changes. Passaged to a third cat no symptoms were manifest but characteristic lesions were found when it was killed on the 18th day. A fourth cat inoculated from the third rapidly lost flesh and died on the 13th day with no symptoms and no evidence post-mortem of infection. Levaditi alludes to this result as an "auto-sterilization" and speaks of "neuro-infections mortelles autosterilisables." *H. S. S.*

FREI (W.), WIESE (J.) & KLESTADT (F.). Harnröhrensekret und Lymphogranuloma inguinale-Reaktion. (Grenzen der sog. Umkehrreaktion.) **[Urethral Secretion and the L.I. Reaction.]**—*Klin. Woch.* 1932. Dec. 17. Vol. 11. No. 51. pp. 2114–2116.

While the absolute specificity of the cuti-reaction which now goes by the senior author's name is upheld, Frei utters a warning regarding conclusions based upon the indirect method of making the test, that is the use of pus from a suspected case of L.I. as the antigen for a skin test in a known case of L.I., and still more the use of discharges from open lesions such as a bubo fistula, a suspected L.I. urethritis or pus or tissue from cases of the genito-ano-rectal syndrome.

In the present article the authors discuss the problem in regard to a case of urethritis the pus from which gave positive skin reactions in L.I. patients. The case was negative to L.I. antigen skin tests and the pus injected into a monkey failed to infect. Frei appears to think the reaction is a non-specific one but allows that further observations will be necessary before this particular case can be explained. *H. S. S.*

ARENAS (Normando). Estiomene de la vulva.—*Semana Méd.* 1932. Nov. 10. Vol. 39. No. 45 (2026). pp. 1377–1386. With 5 figs. [35 refs.]

CALLOL (F. Garriga) & FLO (M. Piera). Algunos casos de linfogranulomatosis inguinal de Nicolas y Favre.—*Rev. Méd. Barcelona.* 1932. Dec. Vol. 18. No. 108. pp. 515–522. With 3 figs.

CASTRONUOVO (G.). Bubbone climatico e forme analoghe. (Malattia di Nicolas e Fabre o quarta malattia venerea o linfogranuloma venereo. Sindromi relative: genito-ano-rettali, ulcero-serpiginose, proliferanti, elefantiasiche, stenosanti.)—*Giorn. Ital. di Malat. Esot. e Trop.* 1933. Feb. 28. Vol. 6. No. 2. pp. 29–36. With 8 figs.

GRANULOMA VENEREUM.

MENON (T. Bhaskara). **Studies on Inguinal Granuloma.**—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 15–20. With 5 figs.

A general description of the disease as met with in Southern India, pointing out at the same time that in the author's opinion there is in a majority of cases an initial genital lesion.

Of 61 cases studied—38 were Tamil, 18 Telugus, 4 Mohammedan Tamils, 1 Malayali ; no cases among Europeans or Anglo-Indians were seen. There was equality in sex incidence. The age incidence was that of sexual maturity. In three-quarters of the male cases there was according to the author a history of a primary penile lesion. Since the infection is auto-inoculable lesions may be seen elsewhere than about the pudenda and contiguous areas. Cases in which the lips, nose, cheek, larynx, the skin of a limb, etc., have been affected are discussed. Viceralization was never seen in Madras. In some cases an inguinal bubo is described, in others merely gland enlargement. Among women " a true non-filarial elephantiasis of the vulva may occur." [In the absence of proof to the contrary it does not appear at all certain that many of the cases seen by the author were not cases of mixed infection —granuloma venereum and climatic bubo infections.]

H. S. Stannus.

WILLIAMSON (Thomas V.), with the Co-operation of James W. ANDERSON, Raymond KIMBROUGH & Austin I. DODSON. **The Specific Effect of " Fouadin " (Fuadin) on Granuloma Inguinale. Preliminary Report.**—*Jl. Amer. Med. Assoc.* 1933. May 27. Vol. 100. No. 21. pp. 1671–1676. With 11 figs. [Summary appears also in *Bulletin of Hygiene.*]

Fouadin, so named in honour of King Fuad, is stated to be antimony-III-pyrocatechin-sodium disulphonate and was found by Prof. KHALIL, University of Cairo, to be superior to other antimony compounds in the treatment of bilharziasis. This led the authors to try it in the treatment of granuloma inguinale [not to be confused with lymphogranuloma inguinale]. The preparation is used in a 7 per cent. solution, and the doses for adults, given intramuscularly, appear to have been on the lines recommended for bilharziasis by the Egyptian workers viz., 1·5, 3·5, and 5·0 cc. on successive days followed by 5·0 cc. on alternate days to a total of 10 to 12 injections. No dangerous effects were noted in the treatment of 14 cases, and the authors conclude that fouadin is a safe and rapid specific for granuloma inguinale. The article is illustrated by numerous photographs illustrating cases before and after treatment. *L. W. Harrison.*

GHOSAL (J. N.). A Case of Granuloma Inguinale.—*Indian Med. Gaz.* 1932. Sept. Vol. 67. No. 9. p. 523.

MURRAY (A. J.). Granuloma Inguinale. Notes on a Chronic Case Successfully Treated with Ultra-Violet Radiations.—*West African Med. Jl.* 1932. Oct. Vol. 6. No. 2. p. 31.

MEDICAL ENTOMOLOGY.

HINMAN (E. Harold). **The Use of Insects and Other Arthropods in Medicine.**—*Jl. Trop. Med. & Hyg.* 1933. May 1. Vol.. 36 No. 9. pp. 128–134. [17 refs.]

The author's summary gives an adequate account of this paper :—

" This rather brief literature resumé calls attention to the value of arthropods in the practice of medicine. The rôle of their extracts and by-products in materia medica, the importance of insect-borne infections in the treatment of paresis, maggots as surgical aids in osteomyelitis, the stitching of wounds by the mandibles of ants and beetles, the possibility of diagnosing human infections through arthropods and finally the rôle they may play in preventive medicine, either in biological control or in the manufacture of immune preparations, all emphasize their latent worth. Thus the Anopheles mosquito, normally a dreaded enemy owing to its malaria-transmitting potentialities, may be deflected from its customary course to inject the parasites from its salivary secretion into the victims of general paralysis, the revolting maggots may be directed to feed upon the micro-organisms in osteomyelitic lesions, the virulent *Dermacentor andersoni* may be converted into Rocky Mountain spotted fever vaccine and certain parasitic or predacious species turned loose upon arthropods transmitting human infections. Truly our greatest enemies may prove useful to us."

Apropos of " xenodiagnosis " and the finding of ASHBURN and CRAIG, and STRONG, that microfilariae are more numerous in blood imbibed from men by the insect host than in blood removed artificially the author made experiments, which he describes, on the possible chemotactic effect of the salivary secretion of mosquitoes on the microfilariae of the dog (*Dirofilaria immitis*). The results were equivocal.

A. G. B.

HECHT (Otto). Experimentelle Beiträge zur Biologie der Stechmücken. II. [**Biology of Mosquitoes : Experimental.**]—*Ztschr. f. angewandte Entom.* 1932. Dec. Vol. 19. No. 4. pp. 579–607. [44 refs.]

This paper deals with three questions : the phenomenon of hibernation in mosquitoes, the oviposition of *Culex pipiens* in the absence of a blood meal, and the importance of temperature stimuli in inducing oviposition.

(i) In the case of *Anopheles maculipennis*, hibernation involves at least a partial dissociation of blood digestion and the maturation of eggs. Thus mosquitoes fed during the winter and kept at low temperatures digest the blood without producing eggs ; at high temperatures a certain proportion produce eggs, though not so rapidly as summer mosquitoes under the same conditions. In the case of *Culex pipiens*, the ingestion of blood during the winter *always* leads to the maturation of eggs, although this is naturally delayed at low temperatures. (ii) This same readiness of *Culex pipiens* to oviposit is shown by the egg-laying of females which have not fed in the adult stage. Hecht's observations on this subject confirm those of previous writers. (iii) When offered a series of vessels containing water at different temperatures, *Culex pipiens* oviposits by preference between 20°C. and 30°C., mostly at the upper part of this range ; almost never at temperatures above 32° or under 18°. The influence of temperature in inducing oviposition is much more effectual than chemical stimuli arising from foul water or hay infusion ; although such stimuli may render water attractive at temperatures which otherwise would be avoided. *V. B. Wigglesworth.*

HECHT (Otto). Experimentelle Beiträge zur Biologie der Stechmücken. IV. [**Biology of Mosquitoes : Experimental.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 256–271. [19 refs.]

In previous publications Hecht has described the relation between feeding and the maturation of eggs in *Anopheles maculipennis* at different seasons of the year and different temperatures, but without taking into consideration possible differences between various races of *A. maculipennis*. In the present paper he compares the race with grey eggs and the race with barred eggs, and finds that these behave alike. During the summer, both can mature their eggs on a single meal of blood. Only if the temperature is too high or too low do a few individuals fail to produce ripe eggs ; under these unfavourable conditions the addition of sugar to the diet leads to increased egg production. In the winter, also, both races show " gonotrophic dissociation " to the same degree : that is, at low temperature blood sucking leads to fat body formation, but at higher temperatures a certain proportion will develop eggs. *V. B. Wigglesworth.*

SHUTE (P. G.). **The Life-History and Habits of British Mosquitoes in Relation to their Control by Antilarval Operations.**—*Jl. Trop. Med. & Hyg.* 1933. Mar. 15. Vol. 36. No. 6. pp. 83–88. With 1 fig.

In anti-mosquito, or rather anti-larval operations, correct identification of the species to be dealt with is the first essential ; next in order of importance comes a knowledge of the life-history, by the aid of which not only may breeding-places be determined and an attack thereon be launched to the best advantage, but futile expenditure of money, time and labour may be avoided. Thus, while the bloodthirsty *Ochlerotatus detritus* of our coastal districts probably produces many generations annually, other species such as *O. rusticus* and *Aëdes cinereus* are single-brooded, so that in their case anti-larval operations, if carried out at the right time, need not be undertaken more than once in the year. All who may be required to conduct such campaigns may derive much profit from a study of the highly interesting notes comprised in the present paper, accompanied as they are by a chart showing at a glance the stages in which twenty out of the twenty-eight British species of mosquitoes are to be met with throughout the year. *E. E. A.*

WEST (Augustus P.) & RUSSELL (Paul F.). **Paris Green Partially Adsorbed on Charcoal as a Larvicide for Anopheles Mosquitoes: Larvicide Studies, II.**—*Philippine Jl. Sci.* 1932. Aug. Vol. 48. No. 4. pp. 545–562. With 2 plates. [14 refs.]

RUSSELL (Paul F.) & WEST (Augustus P.). **Some Studies in the Larvicidal Effects of Arsenicals other than Paris Green against Anopheles Larvae: Larvicide Studies, III.**—*Ibid.* Sept. Vol. 49. No. 1. pp. 97–103.

WEST (Augustus P.) & RUSSELL (Paul F.). **Experiments with Various Toxic Substances Partially Adsorbed on Charcoal as an Anopheles Larvicide: Larvicide Studies, IV.**—*Ibid.* Oct. Vol. 49. No. 2. pp. 211–217. With 1 plate.

RUSSELL (Paul F.) & WEST (Augustus P.). **The Effect on Culex Larvae of Paris Green diluted with Charcoal and Notes on the Feeding Habits of** *Culex quinquefasciatus:* **Larvicide Studies, V.**—*Ibid.* Dec. Vol. 49. No. 4. pp. 651–675. With 3 plates & 1 fig.

These four papers describe attempts at improving and cheapening the existing larvicidal dusts.

In Paper II laboratory tests are described in which poisons have been adsorbed on wood charcoal instead of being simply mixed with charcoal or other diluent as is the usual practice. If a substance is successfully adsorbed, every particle of charcoal should be poisonous, whereas in simple mixtures the particles of diluent are harmless to the larvae. The charcoal used would pass through a 50-mesh sieve. Five grams of charcoal with the requisite amount of Paris green and other substances were mixed with 60 cubic centimetres of water and stirred and heated at 90°C., and then evaporated to dryness and powdered. It is claimed that partial adsorption of the Paris green results, and tests are described which show that "low concentrations of Paris green, less than 1 per cent., proved to be as efficacious as the standard 1 per cent. mixtures of Paris green and diluent as ordinarily used."

In Paper III, other arsenical preparations were mixed with charcoal in the usual way. Paris green proved more efficient than any other preparation such as barium arsenite, lead arsenite or arsenic trioxide. It is concluded that the copper in the Paris green plays an important part.

In Paper IV, various heavy metallic poisons (nickel chromate, barium chloride, etc.) and other substances, such as pyrethrum powder, nicotine, tannic acid, nitre cake and rotenone, "partially adsorbed" on powdered charcoal were tested, but none was as effective as Paris green.

In Paper V, it is shown that Paris green mixed with charcoal and applied on the surface of water in the ordinary way will kill most and sometimes all of the Culex larvae as well as the Anopheles, since Culex larvae spend much of their time feeding at the surface.

V. B. Wigglesworth.

POLITOFF (A.). **[Experimental Application of Chlorpicrin and Carbon Bisulphide in the Control of Mosquito Larvae and Pupae.]**—*Med. Parasit. & Parasitic Dis.* Moscow. 1932. Vol. 1. No. 1. pp. 32–36. [In Russian.]

A series of experiments was conducted on the application of chlorpicrin (CCl_3NO_2) and carbon bisulphide (CS_2)* in the destruction of mosquito larvae and pupae. When added to water chlorpicrin usually sinks to the bottom, though it can also float on the surface when finely sprayed. Its solubility is very low (10·65 gm. in 1 litre of water at 18°C.). The effect of this chemical upon immature mosquitoes was tested both under laboratory and under natural conditions. In the first case it was found that a 1 per cent. mixture killed the larvae and pupae in 5–6 minutes; 0·1 per cent. killed up to 90 per cent. of the larvae during the first half hour; 0·001 per cent. acted more slowly destroying practically all the larvae in 22 hours. The action of chlorpicrin upon the pupae is considerably slower. Chlorpicrin acts both chemically and physically: it poisons the insects and is adhesive. It also kills the other animals, as well as plants, usually found in the natural habitat of the developing mosquitoes, such as insects, crustaceans, fish and tadpoles. The drinking of water containing chlorpicrin in doses 100 times larger than those which kill mosquito larvae, has no harmful effect upon larger animals.

The method was tested under natural conditions in two ways: (1) by spraying 100 gm. of chlorpicrin over the surface of ponds and small swamps; (2) by placing a vessel containing the same amount of chemical at the bottom of the water. The results were tested by placing sieves at the bottom and counting the number of dead young mosquitoes after a short interval. It was found that spraying produced considerably better results. The subsequent dosage used for spraying swamps was about 0·01–0·02 gm. per litre. The use of chlorpicrin in field work is recommended for the following reasons: (1) cheapness, since a single application " charges " the water for an indefinite period; (2) rapid and certain action upon the larvae; (3) harmless effect upon domestic animals drinking such water; and (4) independence from atmospheric conditions. Carbon bisulphide was tested in the same way as chlorpicrin. It has a similar effect upon the young stages of mosquitoes, but being less toxic requires larger doses.

C. A. Hoare.

i. GATER (B. A. R.). **Notes on Malayan Mosquitoes, I. The Genus** *Anopheles*. **II. Seasonal Distribution.**—*Malayan Med. Jl.* 1933. Mar. Vol. 8. No. 1. pp. 39–42; 43–45. With 6 figs.

ii. MILNE (J. Coutts). **Some Malayan Culicines.**—*Ibid.* pp. 46–49. [10 refs.]

i. In the Malay Peninsula twenty-nine species of Anopheles are known to occur, and there may be more. These " Notes," to be continued regularly, are intended " to keep those interested in the practical side of mosquito examination and control informed of the progress of our knowledge." The first paper provides a list of Malayan Anopheles fully authenticated and otherwise, together with notes upon many of them. Pending a comprehensive mosquito survey of the country, an appeal is made for material to be sent to the King Edward VII College of Medicine, Singapore, for expert study and record.

The second paper gives the results obtained by aid of a mosquito trap set on a malarious estate for 198 nights in one year, and also by searching rooms in adjacent coolie lines " on the morning after each night on which the trap was operated." In all, 36,502 mosquitoes, of which 5,442 were anophelines, were caught and examined It was found that Malayan mosquitoes generally, but especially anophelines, are averse from remaining in houses during the day; and that in the case of six anophelines and three culicines, there is a seasonal periodicity not always in harmony with conclusions from larval surveys. Should there prove to be a constant seasonal variation in the numbers of adults of malaria-carrying species, the discovery will be of obvious importance.

ii. At certain seasons the town of Taiping is afflicted with a plague of mosquitoes, which is not confined to any special quarter. Milne furnishes a list of adult culicines taken in houses in Taiping, or reared from larvae found in collections of water within and beyond the oiling area, together with notes on breeding places. *E. E. A.*

DE JESUS (P. I.). **Hydrodynamics of Mosquito Breeding Places.**—*Amer. Jl. Hyg.* 1933. Mar. Vol. 17. No. 2. pp. 502–514. With 2 figs.

Anopheles minimus, "the most efficient vector of malaria in the Philippines," breeds in slowly flowing streams, and the object of the study described in the present paper was to determine the velocities of water tolerated by the larvae of this species during the dry and wet seasons.

Larvae were found where mean velocities ranged from, but did not exceed, 0·05 to 1 ft. per second. Ability to withstand flushing up to the latter speed may be due to the possession by the larvae of well developed grappling hooks at the tips of certain setae in the external supra-anal tufts. *A. minimus* larvae are swept away and breeding becomes impossible when the current is faster than 1 ft. per second. Breeding in this species is not limited to running water, but may also occur in seepage pools. *E E. A.*

DE MEILLON (Botha). **On** *Anopheles funestus* **and its Allies in the Transvaal.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 83–97. With 3 graphs & 8 figs.

This work is an attempt to determine how far the different races or varieties of *Anopheles funestus* differ among themselves in their relation to malaria. The points of distinction between the larvae of *A. funestus* and *A. funestus* var. *leesoni* are described in detail and a key is given to these and closely allied species. In the adult stage *funestus* and its variety can be distinguished only in the male, but there is some evidence that var. *leesoni* does not enter houses so readily as the type form; as the author puts it, the former is not "homophilic" [perhaps "anthropophilic" or "androphile" would be less objectionable !]. Thus, although the position is not yet clear, recent researches suggest that in South Africa, differing biological behaviour within the same species will have to be taken into consideration. *V. B. Wigglesworth.*

GIBBINS (E. G.). **The Domestic** *Anopheles* **Mosquitoes of Uganda.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 15–25. [10 refs.]

The conclusions arrived at in this paper are based on collections made during four years in widely different regions of Uganda. The collections were made in the early part of the day in selected dwellings twice weekly by the same native collectors. In Uganda the prevalence of males in houses does not appear to be of much significance as indicating proximity or otherwise of breeding places. Males occur more frequently in European houses, and it is suggested that light may be a factor of importance. *A. funestus* and *costalis*, the chief malaria-carrying species in Uganda (with a natural infection rate of 15–18 per cent.), show a decided preference for man; whereas *A. mauritianus* var. *ziemanni*, when it occurred in houses, was shown to be attracted by the presence of goats and was of far less importance in the natural transmission of malaria (infection rate 0·3 to 0·5 per cent.). Smoke of the amount usually produced by wood fires, when cooking is carried out within a native hut, does not appear to influence infestation by *A. costalis* and *funestus*. Dwellings surrounded by dense vegetation were found to be particularly attractive to Anopheline mosquitoes. *V. B. Wigglesworth.*

MARTINI (E.) & TEUBNER (E.). Über das Verhalten von Stechmücken besonders von *Anopheles maculipennis* bei verschiedenen Temperaturen und Luftfeuchtigkeiten. **[The Reactions of Mosquitoes, Particularly *A. maculipennis*, to Changes in Temperature and Atmospheric Humidity.]**—*Beihefte z. Arch. f. Schiffs- u. Trop.-hyg.* 1933. Vol. 37. No. 1. pp. 1–80 (1–80). With 10 figs. [61 refs.]

The problem of " anophelism without malaria " has formed the nodal point of most studies on the epidemiology of malaria, in Europe at least, during the last twelve years. But as the authors of this important paper point out, it is really a pseudo-problem, a state of affairs which may be brought about by a great variety of causes; and it should be the object of the malariologist to elucidate these causes separately in each locality. At the present day the favourite hypothesis to explain the absence of malaria in the presence of abundant *Anopheles maculipennis* is that this species has given rise to a number of " biological races " which, though morphologically alike, are distinguished by their food preferences; those in the malarious localities preferring the blood of man and those in the non-malarious localities preferring the blood of animals. Martini & Teubner, while admitting the possible validity of this hypothesis in certain localities, approach the problem from the other side; and consider whether the change that has banished malaria may not be in the environment and not in the mosquito: in other words, a change in the climate. Not the climate of the meteorologist, but the " micro-climate " where the mosquito seeks its food, or hibernates, or rests during digestion. Their thesis is that a very small change in the climate in such places may have far reaching effects upon the behaviour of the mosquito, and so upon the incidence of malaria.

There is nothing new in this idea; indeed, Martini advanced it more than ten years ago. But what is new is its critical examination by means of laboratory experiments correlated with observations in the field. The paper under review represents five years of work along these lines. The experiments consisted in determining the influence of temperature and atmospheric humidity on the duration of life of different species of mosquito, the preferred humidity at constant temperature, and the preferred temperature at constant relative humidity. Field observations concerned the climate of those situations in which wild mosquitoes were actually found during the summer and during hibernation. These sections are followed by a critical review on the present status of the " races " of *Anopheles maculipennis.*

It is impossible to reproduce the wealth of data which the authors adduce; only a few of their conclusions can be noted. The duration of life is greatly increased at high relative humidity in all the species studied (*Culex pipiens*, *Aëdes* (*Stegomyia*) *argenteus*, *Theobaldia annulata* and *Anopheles maculipennis*). But in the case of *A. maculipennis* excessive humidity is harmful, the optimum being about 80–90 per cent. In a chamber with graded humidity, all these species select the moister regions; though in the case of *A. maculipennis* this preference only appears at rather high temperatures. The readiness with which the mosquitoes would select their optimum temperature and humidity varied with their physiological state: young individuals were more sensitive, particularly if fasting, and summer mosquitoes more so than hibernating insects. *Stegomyia* showed the interesting phenomenon of "negative thermotaxis" (seeking the coolest spot) when the saturation deficit in the atmosphere exceeded 6 mm. In nature, *Culex pipiens* and *Theobaldia annulata* select sites for hibernation where the atmosphere is almost saturated; *A. maculipennis* chooses rather less moist spots. The evaporating power of the air is shown also to determine whether mosquitoes will fly and bite; and the micro-climate of the spot where the mosquito has sucked blood determines the duration of its stay.

These statements give only an inadequate impression of the ground covered by the authors; but their main contention is that, in some cases at least, the apparent food preferences of *A. maculipennis*, which determine the incidence of malaria, are really due to the interaction of the micro-climatic predilection of the particular race of insect and the micro-climatic conditions obtaining in the living rooms and stables. Their paper emphasizes the need for further investigation into the effects of climate upon insects. *V. B. Wigglesworth.*

SHIMIDZU (Seiichi). **Studies on the Larva of** *Anopheles vagus* **Dönitz** (*Anopheles formosaensis* **II Tsuzuki), discovered in Tainan.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1933. Apr. Vol. 32. No. 4 (337). [In Japanese. English summary pp. 47–48.]

The author found in Tainan larvae resembling those of *A. ludlowi* but from which emerged adults of *A. vagus*. *Vagus* larvae have not hitherto been found in Formosa. He describes the larval characters.

A. G. B.

i. ROUBAUD (E.), TOUMANOFF (C.) & GASCHEN (H.). Les données de l'indice maxillaire rapportées au rôle infectant des anophèles de l'Indochine septentrionale. [**The Data furnished by the Maxillary Index correlated with the Infectivity of the Species of** *Anopheles* **found in Northern Indochina.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 282–293. With 5 figs.

ii. MORIN (H.). Au sujet de l'indice maxillaire des anophèles de l'Indochine septentrionale. (Essai d'analyse statistique.) [**Maxillary Index of the** *Anopheles* **of Northern Indo-China. (An Essay in Statistical Analysis.)**]—*Ibid.* pp. 293–300. With 2 figs.

i. It had previously been found by TOUMANOFF that the ordinary malaria carriers in Tonking are *Anopheles minimus*, *A. aconitus*, *A. jeyporiensis* and *A. maculatus*. The present paper is concerned with these species, and with *A. hyrcanus sinensis* and *A. vagus* in addition. The two latter, already known to be prone to feed upon animals, were found to have a maxillary index higher than 14; on the other hand the other four species mentioned are definitely paucidentate, having a maxillary index in the neighbourhood of 11. These are therefore ill-equipped for feeding on animals, and are consequently much more dangerous to human beings. The information derived from the examination of the maxillary armament agrees with what is known as to the relative frequency of infection in the insects themselves, and it is urged that the systematic study of dentary indices, as a method of investigation, merits universal application.

ii. Except that *A. maculatus* is omitted, this paper, which likewise relates to Tonking, deals with the same species of Anopheles as the foregoing, and the system followed in the analysis is taken from that in current use for American percentile graphs. The result shows that, in Northern Indochina, the distribution of the denticles on the maxillae of female Anopheles is not fortuitous but specific; that the commonest Anophelines in districts where malaria is absent are multidentate; and that the three species which hitherto have always shown the highest percentage of natural infection with the malarial parasite are definitely paucidentate. It would seem that, where there are many species of *Anopheles*, the determination of the maxillary index, by enabling investigations to be confined to paucidentate species, would expedite the identification of the chief local vector.

E. E. A.

ROUBAUD (E.) & GASCHEN (H.). Insuffisance des caractères de l'oeuf pour la distinction des races trophiques et biologiques de l'*Arophéles maculipennis.* [**Insufficiency of the Egg-Characters for the Distinction of the Trophic and Biologic Races of** *Anopheles maculipennis.*]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 447–451. With 5 figs on 1 plate. [11 refs.]

FALLERONI (1926) distinguished two typical races of *A. maculipennis* according to the morphological characters of the egg. One of these races (*A. maculipennis labranchiae*) lays eggs of dappled grey, with narrow floats; in the other the eggs have dark bands and larger floats. MARTINI, MISSIROLI & HACKETT (1932) have attributed special value to these distinctions from the point of view of anti-malarial praxis, and VERNEY (1932) is of opinion that the *labranchiae* race will shortly be considered the only malaria carrier in Europe. After discussing this contention with the aid of the "opulent terminology" now apparently inseparable from the subject, the present authors conclude that, when the possible relation of *A. maculipennis* to man is in question, the morphological characters of the eggs are of far from primary importance. It is from the maxillary index alone that sound deductions can be drawn. *E. E. A.*

i. SERGENT (Et.) & TRENSZ (F.). Note préliminaire sur la morphologie des oeufs d'*Anopheles maculipennis* de France et d'Algérie. [**Preliminary Note on the Morphology of French and Algerian** *A. maculipennis* **Eggs.**]—*Arch. Inst. Pasteur d'Algérie.* 1933. Mar. Vol. 11. No. 1. pp. 9–11. With 2 plates.

ii. SENEVET (G.). A propos des races d'*Anopheles maculipennis.* [**Concerning the Races of** *A. maculipennis.*]—*Arch. Inst. Pasteur d'Algérie.* 1933. Mar. Vol. 11. No. 1. pp. 12–14.

i. *A. maculipennis* eggs from a locality in France which has long been healthy, and others from two malarious centres in Algeria were found all to belong to the *labranchiae* (*atroparvus*) type, being light grey, irregularly banded or spotted, with striated floats nearer the pointed end. Thus the evidence against the diagnostic value of egg-characters for the distinction of malaria-carrying races of *A. maculipennis* accumulates (see ROUBAUD & GASCHEN above).

ii. This paper, which deals with adults and larvae, forms a supplement to the foregoing, and utilizes characters furnished by the male genital armature, and by the ante-palmate hairs on the fourth and fifth segments of the larval abdomen. Though the material examined is clearly insufficient as a basis for final conclusions, it was found that Algerian specimens, as also others from Argentat and Moustoulat in Corrèze, were referable to the *atroparvus* type; on the other hand adults and larvae from Dordogne would appear to belong to the *messeae* variety. *E. E. A.*

DE BUCK (A.), TORREN (G. V. D.) & SWELLENGREBEL (N. H.). **Report for the Year 1932 on Investigations into the Racial Composition of** ***Anopheles maculipennis*** **in Holland.**—Reprinted from *Riv. di Malariologia.* 1933. Vol. 12. No. 2. 18 pp. With 1 graph & 20 figs. on 4 plates.

To the reader of the papers by ROUBAUD & GASCHEN, and SERGENT & TRENSZ summarized above, the net result of this contribution to the study of " the problem of anophelism without malaria in Holland," otherwise the search for reliable distinctive characters of malaria- and non malaria-carrying races of *A. maculipennis,* may well be mental bewilderment. After setting up a number of possible criteria derived from eggs, larvae, and male and female adults, only to knock the majority of them down again like so many ninepins, the authors conclude that, in the pattern of the dorsal surface of their eggs, the Dutch long- and short-winged races of *A. maculipennis* differ as do the Italian varieties *messeae* and *labranchiae*; and that, as regards reliability, the means of recognition thus afforded " surpasses all other morphological characters and can be compared with our best biological distinctives." *E. E. A.*

DE BUCK (A.) & SWELLENGREBEL (N. H.). **On Anophelism without Malaria around Amsterdam. IV. The Pattern of the Dorsal Surface of the Ova in the Two Races of** *A. maculipennis.*—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1932. Vol. 35. No. 10. pp. 1335–1338. With 6 figs. (2 on 1 plate).

With the reservation that it is usually necessary to examine a whole batch of *A. maculipennis* eggs laid by one female, in order to determine whether the insect belonged to the short-winged or long-winged race, the former being associated with malaria while the latter is not, the authors agree with HACKETT, MARTINI & MISSIROLI (see this *Bulletin,* Vol. 29, p. 832) that " the pattern of the dorsal surface of the ova serves to identify individuals of each race." They differ, however, in ascribing this pattern, both types of which are clearly shown on the plate, not to pigment but to the arrangement of minute processes (columellae and knobs) from the exochorion. [In view of this discrepancy, and in spite of the identity of the dorsal pattern on the eggs, and of the morphology and " epidemiological significance" of the adults, it must, pending further investigation, remain doubtful whether the racial differentiation of *A. maculipennis* in Italy and many areas in Germany on the one hand, and in Holland on the other, has followed an identical course.] *E. E. A.*

i. WEYER (Fritz). Untersuchungen zur Rassenfrage bei *Anopheles maculipennis* in Nordwestdeutschland. **[Investigations into the Question of Races in *Anopheles maculipennis* in N.-W. Germany.]** —*Zent. f. Bakt.* I. Abt. Orig. 1933. Feb. 23. Vol. 127. No. 7/8. pp. 397–417. With 2 figs. [20 refs.]

ii. SWELLENGREBEL (N.) & DE BUCK (A.). Les races hollandaises de l'*Anopheles maculipennis* et leurs rapports avec les races italiennes. **[The Dutch Races of *Anopheles maculipennis* and their Relations to the Italian Races.]**—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 273–281. [14 refs.]

i. East Friesland, which is very similar to North Holland in climate, physical characters and cultivation, and the only region in Germany wherein malaria is still endemic, was selected by Weyer as the scene of a series of investigations designed to determine how far the findings of the Dutch authors (see below) on the vexed question of races in *A. maculipennis* could be substantiated in North-West Germany. Though the results of the enquiry, as set forth in this paper, are often inconclusive, the following among other facts emerge. In N.-W. Germany it is possible to distinguish two races of *A. maculipennis* corresponding to the short- and long-winged races of the Dutch writers; the eggs laid by these races are respectively dappled and banded. Though found for the most part where water is brackish, the former race also occurs where it is fresh. The only true focus of malaria in Germany lies within the area of this race; on the other hand, even where the latter occurs, there may be large areas which are malaria-free. The maxillary index in this race is higher than in the other, which hitherto has only been found where there is no malaria. In both races size varies greatly according to season and place of origin.

ii. To the authors, the problem of the two races of *A. maculipennis* in Holland is primarily one of epidemiology rather than entomology, and the " essential " distinctive characters of these races—the short-winged race, which breeds in brackish water and alone transmits malaria, and the long-winged (freshwater) race—are biological rather than morphological (*cp.* ROUBAUD, this *Bulletin*, 1932, Vol. 29, pp. 831–832). As shown some years ago by ROUBAUD, and confirmed later by the authors, the short-winged race transmits malaria in the autumn because, passing the winter in a state of semi-hibernation, when in houses at this season, it continues to batten on blood though the maturation of the ova is temporarily suspended. In the long-winged race hibernation is complete, and feeding ceases when reproduction is inhibited by cold. While the Dutch short-winged (called by VAN THIEL in 1927 *atroparvus*) and long-winged races of *A. maculipennis* which respectively lay dappled and banded eggs, appear to be identical with the Italian varieties *labranchiae* and *messeae*, it is important to remember that, as shown last year by ROUBAUD, the short-winged race may nearly lose its dangerous character when, during the season of epidemic malaria, it displays and is able to exercise a predilection for animal as opposed to human blood. Conversely the long-winged race may include a strain which has not developed a penchant for animal blood, and is therefore dangerous. With this exception, in Italy as in Holland, *A. maculipennis*, in so far as it transmits malaria, breeds only in brackish water, a fact which accords with ancient belief and is of obvious practical importance.

A short Appendix (termed a "Discussion") by Dr. ROUBAUD expresses general approval of the authors' statements, and stresses the importance of the maxillary index (see ROUBAUD & GASCHEN above) in the diagnosis of zoophily. *E. E. A.*

PATTON (W. S.). **The Identity of** *Culex aegypti* **L.** [Miscellanea].—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 182–184.

Many will doubtless sympathize with this plea for reversal of the recent (1932) decision by EDWARDS henceforth to apply Linnaeus's name *Culex aegypti* (1762) to the yellow fever mosquito, and retention, for this variously named species, of the better known designation *Aëdes* (*Stegomyia*) *fasciata*. It is contended that the characters given for *C. aegypti*, though generally applicable to both, point rather to *Ochlerotatus caspius* than to the latter species. On the other hand, after abandoning the use of *calopus*, American writers have used the name *aegypti* for more than a decade, although the leading German authority on mosquitoes employs *fasciata*. In view of the impossibility of identifying with certainty any one of the venerable descriptions involved, this diversity in nomenclature, regrettable though it be, will doubtless continue. *E. E. Austen.*

DOVE (W. E.), HALL (D. G.) & HULL (J. B.). **The Salt Marsh Sand Fly Problem (Culicoides).**—Reprinted from *Ann. Entom. Soc. of America.* 1932. Sept. Vol. 25. No. 3. pp. 505–522. With 2 figs. & 3 plates.

This paper is a preliminary report on the blood-sucking midges (Culicoides) occurring along the Atlantic and Gulf Coast littorals, where the annoyance due to the bites of these insects seriously affects the tourist business. The studies were limited to the grass type of salt marsh as opposed to the mangrove swamp. In such localities the "sand fly" larvae were found concentrated in decaying humus in the densely shaded areas at the edges of the marshes; and the only medium in which they could be reared in captivity was decaying grass roots and humus in brackish water. The larvae are probably dispersed when they are reached by high tides and also when they occur in ditches up which the tide can flow. On the other hand, partially blocked ditches favour "sand fly" breeding. For control, the authors advocate drying the ground in their breeding places by means of drainage or by trimming the shade trees near the edges of the grass marshes. A by-product in the treatment of timber with creosote, termed "phenolized pine sap" has proved very effective in killing the larvae under experimental conditions but it has not yet been tested in the field. *V. B. Wigglesworth.*

HALL (D. G.), HULL (J. B.) & DOVE (W. E.). **New Method in Sand Fly Studies (Diptera: Chironomidae).**—Reprinted from *Entom. News.* 1933. Feb. Vol. 44. No. 2. pp. 29–32. With 2 figs. on 1 plate.

Among other matters this paper includes a description of a simple light trap made to fit over the headlight of an automobile and useful for collecting insects such as Culicoides that are attracted to light.

V. B. Wigglesworth.

v. SZENTKIRÁLYI (S.) & v. LÖRINCZ (F.). Ueber eigenartige infolge von Phlebotomusstichen hervorgerufene Dermatosen. Das Vorkommen von Phlebotomus in Ungarn. [**A Peculiar Dermatitis caused by the Bites of Phlebotomus in Hungary.**]—*Dermat. Woch.* 1933. Mar. 4. Vol. 96. No. 9. pp. 289–296. With 6 figs. [10 refs.]

During August 1931 about 30 patients were observed in Hódmezővásárhely suffering from an unfamiliar type of dermatitis. This began with intense itching and was followed next day by a papular or vesicular eruption occurring always on the exposed parts of the body; and proved to be caused by the bites of Phlebotomus [the species is not reported], an insect that does not appear to have been recorded before from Hungary. The course of the eruption is fully described in several cases and illustrated by photographs. There was much variation in detail between different individuals; in some cases where the local reaction was very pronounced there were severe general "toxic symptoms." The incrimination of Phlebotomus was confirmed by producing the same symptoms experimentally by its bite. All these findings agree exactly with those of DOSTROWSKY on "harara" or what he calls *urticaria multiformis externa (e phlebotomica)* in Palestine in 1925: a widespread dermatitis caused by the bites of Phlebotomus [see this *Bulletin*, Vol. 23, p. 402]. The authors could not satisfy themselves whether the condition was of an anaphylactic nature; certainly it did not develop in all persons who were bitten. The sudden appearance of the disease and the insect in 1931 is attributed to the exceptionally high mean temperature in the summer of that year. *V. B. Wigglesworth.*

PATTON (W. S.). **Studies on the Higher Diptera of Medical and Veterinary Importance. A Revision of the Genera of the Tribe Muscini, Subfamily Muscinae, based on a Comparative Study of the Male Terminalia. I. The Genus *Musca* Linnaeus.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 135–156. With 11 figs.

In the act of sucking blood as practised by a tsetse-fly or a Stomoxys, a considerable portion of the actual proboscis is thrust into the victim. A blood-drinking species of the genus *Musca*, on the other hand, albeit equipped with teeth and other offensive armament on its prestomal sclerite, cannot do more than remove a scab, or at most scratch and tear the skin. Its proboscis is therefore not an actual piercing instrument, and structural differences in this organ between species of ***Musca*** which are phlebotomic, and others such as ***M. domestica*** which are not, are differences of degree and not of kind. This paper is devoted to showing, by means of description and graphic illustration, that the grouping of the species of *Musca* previously established by the author, on the basis of the male terminalia [*ante*, p. 309], is confirmed by the structure and action of the proboscis in the blood-sucking forms. The method of drawing blood by various species is described and in some cases illustrated.

The author hopes, in his next paper to be published in this series, to investigate the right of " the many genera erected in *Stomoxys* (sens. lat.) " to continued existence [in which connexion again see this *Bulletin, loc. cit.*]. *E. E. A.*

BEDFORD (George V.), WILLIAMS (Donald H.) & NEWTON (M. V. B.). **Creeping Eruption, with Special Reference to Cutaneous Myiasis and Report of a Case.**—*Canadian Med. Assoc. Jl.* 1933. Apr. Vol. 28. No. 4. pp. 377–382. With 3 figs. [36 refs.]

A case of larva migrans caused by the larva of the bot-fly, *Gastrophilus intestinalis*, is described. This occurred in a farmer from the region of Winnipeg, and was of one month's duration. " The eruption presented itself as a tortuous raised and palpable dark brown linear lesion. For about one inch the lesion was acutely inflamed, and presented the appearance of an herpetic eruption, five or six vesicles being grouped together." When clear machine oil was applied, a black dot could be seen. This was removed with the point of a needle and proved to be the first stage larva of *G. intestinalis*. The subject of " creeping eruption " is reviewed at some length, and it is pointed out that at least seven different parasites have been found causing the condition, most cases probably being due to nematode worms of which *Ancylostoma braziliense* is the commonest.

V. B. Wigglesworth.

GERTSON (G. D.), LANCASTER (W. E. G.), LARSON (G. A.) & WHEELER (G. C.). **Wohlfahrtia Myiasis in North Dakota. Report of Two Cases.**—*Jl. Amer. Med. Assoc.* 1933. Feb. 18. Vol. 100. No. 7. pp. 487–488. [10 refs.]

Two cases of myiasis due to *W. vigil* are described from North Dakota; one in the base of the penis of an infant of 4 months, the other in the upper eyelid of an infant of 8 months. References to previous cases from the same region are given.

V. B. Wigglesworth.

NASH (T. A. M.). **The Ecology of** *Glossina morsitans*, **Westw., and Two Possible Methods for its Destruction.—Part I.**—*Bull. Entom. Res.* 1933. Mar. Vol. 24. Pt. 1. pp. 107–157. With 8 figs. (4 on 2 folding plates).

Although *Glossina morsitans* was first encountered by an Englishman nearly a century ago, no adequate account of the ecology of this vector of human and animal trypanosomiasis has hitherto appeared. The present contribution, which is the result of four and a-half years' observation by its author at the Kikori Entomological Station, in Tanganyika, is therefore to be welcomed. The facts and conclusions recorded are derived from three different " fly-rounds," *i.e.*, surveys of tsetse along fixed routes, " repeated at definite short intervals throughout the year," during which there are two dry and two wet seasons.

A paper of the length of this, packed with facts, clearly cannot be compressed into a few paragraphs; all that is possible is to mention certain of the more important points.

In a *G. morsitans* belt the fly varies in abundance from year to year, and according to season; pupae invariably perish if immersed in water or buried in water-logged soil for more than four days; thus abnormally heavy rainfall may almost exterminate the insect, but years of low rainfall are favourable to the fly. If the seasonal bush fires be suppressed the fly community at first benefits, but afterwards suffers when the old grass mixed with new becomes unattractive to game. In the development and activity of the fly, temperature is not of primary importance. The longevity of the insect depends upon evaporation, and "seasonal fluctuations in fly density can be correlated with fluctuations in the evaporative power of the air." *G. morsitans* decreases in numbers when evaporation exceeds or falls below a mean monthly rate of 20–25 cc. a day, which stimulates breeding "and results in a maximum density in the following month;" towards the end of the dry season the fly population diminishes.

Such as deny the efficacy of wholesale destruction of big game for the abolition of tsetse will be gratified to learn that, "of the three great factors—season, vegetation and game," the author considers the last of least importance. "Only large game movements produce noticeable effects upon the fly community," which may conceivably flourish at the expense of the wart-hog, a favoured and ubiquitous host. As for the vegetation factor, *Brachystegia microphylla* woods are much more attractive to *G. morsitans* than any others, so that in the fly-belt under consideration effective reclamation might be secured by clearing only these and *Berlinia* woods, wherein breeding also occurs.

Well defined game paths converging upon water-holes, or even paths cut for the purpose, appear to act like so many Ariadne's threads to hungry tsetse, which travel along them until a fly concentration is produced. Should an effective trap for *G. morsitans* be devised, it might be possible to deal successfully with a large area of fly by means of such a trap placed "at the junction of paths cut to meet in a point," perhaps with the addition of a trap at the opposite end of each path to receive tsetse flying the wrong way.

In the final section of the paper the activities of *G. swynnertoni*, *G. palpalis* and *G. pallidipes* are compared with those of *G. morsitans*.

E. E. A.

GALLIARD (H.). Glossines du Gabon occidental. [**Western Gabun Tsetse-Flies.**]—*Ann. Parasit. Humaine et Comparée.* 1933. Mar. 1. Vol. 11. No. 2. pp. 81–92. With 1 map & 1 fig.

The tsetse-flies of Gabun—the country of du CHAILLU and of Mary KINGSLEY—being probably less known than those of any other part of Africa, the present is a welcome contribution to knowledge. Working to the west of the N'gounié River during the dry and part of the wet season of 1930, the author met with *G. palpalis*, *G. fusca*, *G. tabaniformis*, *G. pallicera* and *G. haningtoni*. Of each of the two latter, the occurrence of which in Gabun was previously unknown, only a single specimen was secured. Useful notes are furnished on haunts and habits, as affected by the dry and wet seasons. At the end of the rains, during sunshine, *G. tabaniformis*, previously regarded as more especially a forest species, bit freely on the sea-shore at Mayumba. This species, like *G. palpalis*, which in the evening may be brought in by water-carriers, is attracted by artificial light, and both may enter native huts at night. The author, who displays familiarity with the observations of others, does not consider that the preference of tsetse-flies for a diet of human or animal blood can be deduced from the predominance of either sex in catches, or that the latter affords useful indications as to the presence or absence of preferred hosts, or the suitability or otherwise of haunts. *E. E. A.*

SWYNNERTON (C. F. M.). **Some Traps for Tsetse-Flies.**—*Bull. Entom. Res.* 1933. Mar. Vol. 24. Pt. 1. pp. 69–102. With 4 diagrams & 3 plates.

In local tsetse-fly control, traps seem destined to play a most important part, and much interest has recently been aroused by the enormous captures of *Glossina pallidipes* made by HARRIS in Zululand with a trap of his own devising. The matter however is not new, and in Tanganyika so long ago as 1922 Swynnerton used hide, hessian or cloth screens to attract tsetse-flies, which were then caught by hand with nets, or on bird-lime smeared on the screens.

Since the latter end of 1930, starting with a wire-gauze catching-cage placed on top of the screen, and keeping the attraction of the latter ever in view, Swynnerton has made and experimented with more than twenty forms of traps, of which an illustrated account, with full constructional details, is given in this paper. The traps were tested upon *Glossina palpalis, G. pallidipes, G. morsitans* and *G. swynnertoni*.

An effective trap is one containing a live calf, screened from actual attack by the flies; a scent by which the animal may be replaced is now being sought for, and should this quest prove successful great results are anticipated. In the meantime most effective of all is a moving screen carried by expert fly-boys, who are able to catch with the net practically every fly that the screen attracts. *G. pallidipes* and *G. palpalis* can readily be caught by any suitable trap, but other species (*G. morsitans* and *G. swynnertoni*) are less responsive to the trapper's wiles. It is also noted that, whereas areas infested by *G. palpalis* are naturally restricted, the habitats of *G. morsitans, G. swynnertoni* and *G. pallidipes* are so extensive that these species can only be kept under by traps provided that all the flies can be reached, although attack be confined to limited spots.

Effective control by aid of traps is apparently feasible under certain conditions in the case of *G. pallidipes*; in that of *G. palpalis*, if the infested river- or lakeside fringing thicket be first divided by clearings into lengths of manageable size, prospects are even better. The main *indirect* influences which affect trapping are meteorological; trapping succeeds best when the evaporation rate is high.

A *G. morsitans* area is divisible into wooded "homes" of the fly, and feeding-grounds, which are more or less open spaces, with other characteristics. With minor modifications this applies also to the other species of tsetse. In a large fly-belt (the greatest length and breadth of the largest in Tanganyika are respectively 500 and 300 miles) it is obviously impracticable to cover the entire area closely with traps, and for this and other reasons the feeding-grounds are the best places in which to trap. Valuable notes are given on the siting and setting of traps, which should be as conspicuous as possible; for successful trapping, knowledge of the habits of tsetse is essential. In order to test the "exterminative value" of trapping the four species of tsetse mentioned above, further experiments are to be made in three isolated areas, and the outcome of these will be eagerly awaited. Meanwhile no one concerned with the subject of tsetse control can afford to ignore this extremely valuable paper. *E. E. A.*

JUSSIANT. Contribution à la prophylaxie des trypanosomiases animales et humaines. [**Contribution to the Prophylaxis of Animal and Human Trypanosomiases.**]—*Bull. Méd. du Katanga.* 1933. Vol. 10. No. 1. pp. 8, 11–12, 14–15.

Glossina palpalis, which infests the fringing forest along all watercourses in the Lomami-Kasaï region of Belgian Congo, is the most important obstacle to the development of the local stock-raising industry. Precautions are taken to prevent stock from entering these fly-belts; artificial watering-places are provided, and where there is special liability to infection herds are driven to them after sunset, or at dawn. Besides measures of the usual kind against the fly, extensive use is made of the Harris trap, which is said to give excellent results. As the outcome of all this, the problem of stock-raising on the Lomami is said to have been solved. The Harris trap, manufactured locally, is now in regular use in the stock-raising area, and can equally well be employed for the protection of human communities. It functions best on cleared ground, fully exposed to the sun, three or four metres from the strip of forest along a stream.

E. E. A.

ADVIER (M.). Etude sur les puces de la région de Dakar. [**Fleas in Dakar.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 452–454.

This is a survey of the fleas on rodents and in native houses in Dakar, extending over 12 months of the year and based on 43,592 identified parasites. *Xenopsylla cheopis* is the predominant flea of rodents (70 per cent.), *Echidnophaga gallinacea* coming next (24 per cent.). But among the fleas taken free in houses *Synosternus pallidus* is by far the most abundant (95 per cent.), *X. cheopis* being very rare. *S. pallidus* is primarily a parasite of man, and formed only 5 per cent. of the fleas on rats. *Pulex irritans* was not taken. *Ctenocephalus* occurred sparsely (about 2 per cent.) in both collections.

V. B. Wigglesworth.

GASCHEN (H.). Sur la présence de *Xenopsylla brasiliensis* et *Xenopsylla astia* sur les rongeurs domestiques de la région de Dakar. [*X. brasiliensis* **and** *X. astia* **in Domestic Rodents in the Dakar Region.**]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 25–27.

The author has examined a number of fleas collected on rats in the Dakar region and sent to ROUBAUD by MATHIS & BAURY.

X. cheopis is in marked predominance, whereas in another part of Senegal, Tivaouane, it gives place to *Synosternus pallidus* [this *Bulletin,* Vol. 29, p. 154]. *X. brasiliensis* has not hitherto been reported from Senegal though it is known in Nigeria (CONNAL), and in Freetown, Sierra Leone (BLACKLOCK & THOMSON, 1924) [*loc. cit.* Vol. 22, p. 297]. Of 720 fleas examined, the percentages were as follows :—

Xenopsylla cheopis	64·2
Echidnophaga gallinacea	17·5
Xenopsylla astia	12·2
Xenopsylla brasiliensis	5·5
Synosternus pallidus	0·3
Ctenocephalus felis and *canis*	0·3

A. G. B.

JAMESON (G. D.). **An Experiment to exterminate Bugs from Infested Buildings.**—*Jl. Roy. Army Med. Corps.* 1933. Feb. Vol, 60. No. 2. pp. 138–139.

An account of two experiments, one successful, to exterminate bugs in barracks at Gibraltar by means of ants ; the species was *Monomorium pharaonis* (?).

" The following points appear to be absolutely essential for success : (*a*) An entire nest complete with eggs, etc., must be obtained. This probably explains the failure of the second experiment. Both the colonies of ants used were collected by myself, and while (1) was apparently a complete nest and contained a large number of eggs, (2) was more in the nature of a collection of ants in earth and no eggs could be observed. (*b*) The ants' nest must be collected at the time of the year during which eggs are laid and hatched in large numbers. (*c*) Care must be taken that sources of food other than bugs are not available for the ants. Crumbs, etc., must be carefully removed after meals, and all stored food must be " ant-proof." *A. G. B.*

HOEPPLI (R.) & FENG (L. C.). **Experimental Studies on Ticks.**—*Chinese Med. Jl.* 1933. Jan. Vol. 47. No. 1. pp. 29–43. With 4 coloured plates. [28 refs.]

This paper is in three parts : (i) deals with the skin lesions caused by natural infection with the ticks, *Hyalomma detritum*, *Argas pipistrellae*, *Ixodes* sp. and *Boophilus* sp. ; (ii) with the effects of extracts of ticks on blood coagulation ; and (iii) with the toxicity of emulsions of ticks injected into animals.

(i) Immediately round the mouth parts of the tick there is a homogeneous or necrotic zone probably due to a liquefying effect of the salivary secretion on the tissues. The surrounding corium shows perivascular infiltration with hyperaemia, oedema and haemorrhages. The cornified epithelium is thickened. The liquefaction of the tissues is regarded as merely incidental, and not as an essential process of extra-intestinal digestion such as occurs in many mites ; for the tick feeds on the blood itself.

(ii) The salivary glands of *Dermacentor sinicus* and *Hyalomma* contain a powerful anticoagulin.

(iii) Emulsions from the eggs of Dermacentor, Haemaphysalis and Hyalomma were very toxic when injected into dogs, rats, guineapigs, etc., but none of these animals showed symptoms of tick paralysis. Histologically they showed degeneration of the ganglion cells and myelin sheaths in the spinal cord, degenerative changes in the liver and in the kidney tubules and necrosis in the lymph follicles of the spleen. *V. B. Wigglesworth.*

FUSS (S.) & HANSER (R.). Ueber Trombidiosis. [**Trombidiosis.**]—*Arch. Dermat. u. Syph.* 1933. Mar. 2. Vol. 167. No. 3. pp. 644–658. With 3 figs. (1 map.)

An account is here given of the biology and distribution in Germany of *Trombicula autumnalis*, the clinical and histological effects of the bites of this mite, and the diagnosis and treatment of the lesions it causes. The mites are curiously local in distribution, often being confined year after year to particular gardens for no apparent reason. In feeding they remain outside the skin and inject a secretion which causes necrosis of the epidermis, and induces a well marked inflammatory reaction with accumulation of leucocytes, transudation, hyperaemia and subcutaneous haemorrhage. The whole process is accompanied by intense itching and it follows the same course even if the mites are removed immediately after biting. The bites occur on the covered parts of the body, especially where the skin is pressed upon by elastic garters and such like. The most important part of treatment is prophylaxis, which consists in avoiding localities known to be infested. For the relief of the itching caused by the bites, the authors have found that the common domestic remedy of rubbing the part with soap is as good as any. *V. B. Wigglesworth.*

PAWLOWSKY (E. N.) & STEIN (A. K.). Ueber die Wirkung von *Dermanyssus gallinae* auf die Hautdecken des Menschen. [**The Effect of *D. gallinae* on the Human Skin.**]—*Ztschr. f. Parasitenk.* 1933. Feb. 16. Vol. 5. No. 2. pp. 421–424. With 2 figs.

The mites were confined in a petri dish secured to the forearm, and the lesions they produced were examined histologically. There was slight oedema and inflammatory infiltration of the dermis with dilatation of the capillaries, and there were defects in the stratum corneum. It is considered that the damage to the stratum corneum is produced mechanically by the chelicerae of the mites, but that the underlying inflammation is caused by the injection of saliva.

V. B. Wigglesworth.

AFRICA (Candido M.). **An Arthropod Associated with a Chronic Dermatitis involving the Face.**—*Philippine Jl. Sci.* 1933. Feb. Vol. 50. No. 2. pp. 205–209. With 2 plates.

Demodex folliculorum, which is said to occur in 50 per cent. of mankind, is generally considered as a harmless parasite ; but a case of long standing dermatitis due to this mite is here described. The condition arose in the margins of healed mustard gas lesions on the face and consisted of pinhead vesicular eruptions causing almost intolerable itching. Biopsy revealed the mites in the thickened horny layers of the skin, and the epithelium had proliferated and dipped into the stratum corium in many places. (Although this case showed no signs of malignancy, the author points out that such prolonged irritation might eventually lead to epithelioma.) The patient had been treated with every kind of dressing by many physicians for ten years without profit. Repeated freezing with the ethyl chloride spray proved very successful. *V. B. Wigglesworth.*

MORISHITA (Kaoru) & OMORI (Nanzaburo). **A Mite of the Genus *Liponyssus* found in Taihoku.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1933. Feb. Vol. 32. No. 2. (335). With 6 figs. on 1 plate. [In Japanese. English summary pp. 19–20.]

The authors discuss the mite found in Taihoku, Formosa, which attacks both rat and man and question whether it should be named *L. bacoti* or *L. nagayoi.* *A. G. B.*

BAEZA CUÉLLAR (Mariano). Estudio médico de los culicidos hematófagos.—pp. iv + 158. With 80 figs. 1933. Madrid : Talleres Gráficos Herrera, Hermosilla, Numero 44.

BISHOPP (F. C.). What Workers with Mosquitoes have Accomplished Around the World in 1930 and 1931.—Reprinted from *Proc. 19th Ann. Meeting New Jersey Mosquito Extermination Assoc. 1932. Feb. 17–19.* 20 pp.

BODE (H. G.). Schlusswort zu den vorstehenden Bemerkungen von Dr. HECHT.—*Dermat. Woch.* 1933. Apr. 29. Vol. 96. No. 17. pp. 590–591.

HECHT (Otto). Bemerkung zur Arbeit von H.-G. BODE : " Zur Kenntnis atypischer Mückenstichreaktionen (Culicosis bullosa)."—*Dermat. Woch.* 1933. Apr. 29. Vol. 96. No. 17. pp. 588–590.

McKAY (W. J. Stewart). Facial Paralysis following Tick-Bite. [Correspondence.]—*Med. Jl. Australia.* 1933. Feb. 11. 20th Year. Vol. 1. No. 6. pp. 204–205.

MARTINI (Erich) & TEUBNER (Ernst). Stechmücken und Mikroklima.—Reprinted from *Forschungen u. Fortschritte.* 1932. Feb. 20. Vol. 8. No. 6. 2 pp.

PINTO (Cesar). Alguns mosquitos do Brasil e do oriente da Bolivia (Diptera. Culicidae).—*Rev. Med.-Cirug. do Brasil.* 1932. Oct. Vol. 40. No. 10. pp. 285–309. With 17 figs.

ROBINSON (William). The Use of Blowfly Maggots in the Treatment of Osteomyelitis and Certain Other Diseases.—*U.S. Dept. of Agric. Bureau of Entomology.* 1932. Mar. 1. 2 mimeographed pp.

ROBINSON (William). The Rearing of Blowflies and the Culture of Sterile Maggots for Use in Osteomyelitis.—*U.S. Dept. of Agric. Bureau of Entomology.* 1932. Mar. 9. 8 mimeographed pp. [12 refs.]

YELLOW FEVER.

MEASURES FOR THE PREVENTION AND CONTROL OF YELLOW FEVER EPIDEMICS IN FRENCH WEST AFRICA.

The administration in French West Africa has recently issued Regulations laying down special temporary and defensive measures for the prevention and control of yellow fever epidemics in the Territory[1] and with the Regulations a Circular Letter[2] making recommendations for the organization of investigation and prophylaxis to be established in areas which are susceptible to invasion or outbreaks of yellow fever, so that machinery will exist ready to combat and prevent the spread of the disease.

The circular letter points out that the experience of recent years has once again confirmed our scientific knowledge of the primordial rôle which is played by the native as the reservoir of the virus of yellow fever, in the causation of outbreaks of yellow fever and in the spread of this endemo-epidemic disease and of the *Stegomyia fasciata* or *Aëdes aegypti* as its intermediary or vector.

The development and the changes which have taken place in the social life of the native population and their movement beyond the formerly circumscribed areas of their villages which now freely takes place by the development of river, road and even sea traffic has had the effect of converting yellow fever into a veritable " disease of pathways " (*"maladie des sentiers "*), resulting in a further unknown quantity as regards the risks of contagion by this free circulation of the human reservoir of the virus in the form of carriers. There is, then, more than ever an urgent necessity for a methodic, permanent and vigilant campaign for the limiting of this menace by every possible means of information and action that can be brought into play. To this end each local civil administration in the Territory is asked to undertake a comprehensive and detailed inquiry among the chiefs of the cantons and of the villages, and generally among intelligent natives, into the following circumstances :—

(1) Has the disease known by Europeans as yellow fever been observed, and since when, in the village, canton, sub-division or area ?

(2) What is the name of the disease in the local language ?

(3) What are the age, sex and the occupation of the persons who are usually attacked ?

(4) Is there any special seasonal incidence of the disease ?

(5) Is there a regular rhythmic appearance each year, or does it appear irregularly ?

(6) By what symptoms does the disease manifest itself ?

(7) What is its duration ?

(8) Does it attack isolated individuals, or does it spread into the neighbourhood ?

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[1] (*b*) Arrêté portant réglementation des mesures d'ordre spécial, temporaire et défensif, destinées à prévenir ou à faire cesser les épidémies de typhus amaril en Afrique Occidentale Française. (*Journal Officiel de l'Afrique Occidentale Française* du 1er avril 1933.) See also Extract in *Bull. Office Internat. d'Hyg. publique*, 1933, vol. 25, pp. 745–753.

[2] I.—AFRIQUE OCCIDENTALE FRANÇAISE).—(*a*) Circulaire du Gouverneur Géneral, du 23 mars 1933, concernant l'organisation de la campagne pré-amarile. (*Journal Officiel de l'Afrique Occidentale Française* du 1er avril 1933.) See also Extract in *Bull. Office Internat. d'Hyg. publique*, 1933, vol. 25, pp. 742–745.

(9) What is the approximate period of contagion ?

(10) What is the probable number of the sick, those who recover and those who die in relation to the total population ?

(11) Has a second attack ever been observed among those previously attacked ?

(12) What is the treatment given for this disease ?

Maps and, if necessary, graphs should be made from the information thus received so as to make the apparent incidence and extent of the disease, according to these natives' reports, as clear as possible. The health administration, for their part, should carry out a systematic scientific investigation with a view to eliminating the principal causes of error in the information collected by the administrative side by making a more scientific diagnosis by means, for example, of serum tests and by collaborating with the administrative side with a view to expediting the despatch to the laboratory of the blood samples, etc., taken. The chiefs of cantons and the headmen of villages should be instructed in the great importance of sending an immediate report to the administrator of all suspected sickness and death from yellow fever with the object of obtaining prompt medical assistance as regards treatment and expert advice on the immediate measures for prevention of the spread of the disease.

The covering note concludes with an outline of a sanitary organization for the control of insect vectors, for the improvement of the sanitary state of villages and for the close supervision of sick natives with a view to discovering early and abortive cases of yellow fever. Mobile sanitary units are to be established, comprising the following equipment :—

A microscope with slides, stains, etc. ; equipment for taking blood samples ; collapsible mosquito proof chambers ; mosquito netting ; boots and gloves for the protection of the personnel ; overalls and rubber gloves for the Medical Officers ; postmortem outfit ; flasks for the preservation and despatch of histological material ; hand sprays ; liquid insecticide ; fixing agent ; an abundant supply of sulphur and two large tarpaulins, such as are used by railway companies.

The whole of this equipment should be so prepared that it can easily and rapidly be packed on a motor lorry or truck for immediate despatch to a distant area. The use of this outfit implies, if it is going to be of any value, the formation of a team of hygienists, which should include a specially trained European Medical Officer. Besides this there should be established, within approximately ½ mile of each important agglomeration of population and especially close to highway crossings, a sanitary station for the isolation, observation and segregation of cases. Existing accommodation should be used or else improvised mosquito proof installations capable of rapid erection. There should be an organized scheme for making use of the native element as an aid to the organization and maintenance of these local installations. This can best be done by health teaching among selected members of the population by means of talks, tracts, posters, notices, etc., adapted to the limitations of the various mentalities.

The regulations prescribe, in considerable detail, special temporary and defensive measures to be carried out for the prevention and control of epidemics of yellow fever which threaten or exist. These special measures are ancillary or supplementary to standing instructions which have been previously issued in the form of local Orders by the Lieutenant-Governors of colonies and by the Administrator of the Dakar area. The new Regulations are divided into three parts depending on the conditions which exist in the area :—

(1) A régime to be followed when the public health is in imminent danger by reason of the existence of yellow fever in the neighbouring regions or on account of the past history of the area, or temporarily during certain seasons or when movements of population take place. In such circumstances any case with signs of fever must be immediately isolated under mosquito netting until the sick person has been visited by a doctor or, failing that, for the first five days of the sickness. Such cases must be at once reported by the chiefs of the villages, native headmen, etc., to the medical authority as well as any deaths which are occurring among the population. The health service will then undertake regular domiciliary visits, with as little delay as possible, with a view to confirming the reports and to ascertaining any undiscovered cases of fever and placing them under control.

Any suspected case which responds to the " prophylactic diagnosis," as defined by the African Conference on Yellow Fever of 1928, must be notified to the administrative authority either by the Medical Officer or by the sick person himself or by his relatives, etc. Persons of European stock may not move freely about in areas, to be defined by the administration, where suspected cases have been discovered among the native population, and in any event any movement permitted must be subject to the possession of a satisfactory sanitary passport. In the case of a man moving from one area to another, he will be required to present himself daily for medical examination for a period of six days from the date of his leaving the area, and in no event will a man be allowed to enter a " danger zone," even if he comes from an uninfected area, unless his sanitary passport shows that at the time of his departure there were no symptoms of febrile disease.

(2) A régime of " sanitary supervision " is to be applied when one or more proved cases of yellow fever appear in a town or in a circumscribed area without necessarily constituting a focus of infection.

Proof is taken to mean a case in which the diagnosis on clinical evidence is confirmed and controlled, whenever possible, by a microscopic examination. Should the patient survive, a systematic examination should be undertaken by the Pasteur Institute at Dakar by means of samples of blood, in order to confirm the original diagnosis and then by protection tests in order to ascertain the extent of the infection in the area concerned. A strict notification of cases must be sent to the administrative authorities without delay and similar notifications will be forwarded to neighbouring colonies. Direct relations should then be established between the authorities of the infected colony and neighbouring colonies in order that suitable measures may be taken to protect the latter from the spread of the disease into their territory.

As far as the infected area is concerned, all cafés, restaurants, dance halls, cinemas, shops, etc., shall close at 9 p.m. and any such places in the near neighbourhood of a case of yellow fever shall be asked to close their establishments from 5.30 p.m. to 6.30 a.m. for the time being.

All persons resident in the area placed under supervision must protect themselves at night by mosquito netting either in a room, building or under a net, in such a way that protection is efficacious. The same conditions as to movement and the provision of a sanitary passport, as laid down in the previous paragraph, apply here but more strictly.

(3) A system of "sanitary observation" is to be applied, in any town or area, when several cases of yellow fever occur, in such a way as to constitute or to threaten to become a focus of infection. A "focus" is here defined as existing when the occurrence of new cases outside the immediate surroundings of the first cases proves that the spread of the disease has not been limited to the place where it began. Stricter regulations are laid down in regard to the employment of workers in workshops and to the opening of public places during the evening hours and the night. All meetings are forbidden, and as regards movements no one may leave the infected area unless furnished with a sanitary passport certifying that he shows no febrile symptoms and that his effects have been disinsected and that he has passed the six preceding nights in a mosquito-proof dwelling which is under the control of the medical authority or in an approved observation station.

All persons coming from non-infected regions and crossing the contaminated zone during a period of less than six days may be granted a sanitary passport if, from the time of his arrival to the time of his departure, he has been isolated each night under the conditions referred to above.

Trucks, waggons and all vehicles for the transport of travellers and merchandise must be disinsected before leaving the contaminated zone and the compartments of the train occupied by individuals must be effectively mosquito-proofed. It is forbidden to export from the infected area merchandise capable of harbouring mosquitoes, unless it has been disinsected in the prescribed manner, such as empty bottles, straw packages and similar receptacles, and all products containing sugar, whether fresh or dried, loaded loose or packed in crates.

Finally, all the above measures are applicable and will be vigorously applied to aircraft (personnel, passengers, material and baggage). Consequently any aircraft leaving a zone coming within one of the three above-mentioned régimes will undergo before its departure the measures in force in that zone and, furthermore, will be boarded on its arrival at aerodromes of transit and destination. In a case of accidental landing boarding will be carried out by the nearest Medical Officer.

Permanent Commissions for Sanitary Control will be established by the local authorities in areas coming under one of the three régimes whose mission will be to control the execution of the protective measures laid down and to verify the facts, making a report thereon the same day. These reports can be used, if necessary, for immediate judicial procedure. *M. T. Morgan.*

MISCELLANEOUS.

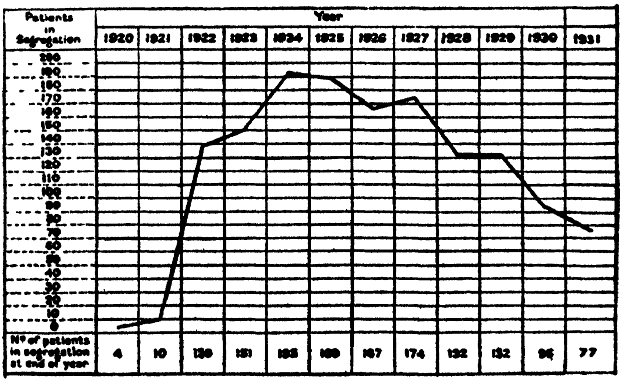
Grant (Alan M. B.). **A Medical Survey of the Island of Nauru.**—*Med. Jl. Australia.* 1933. Jan. 28. Vol. 1. No. 4. pp. 113–118. With 2 figs. & 2 graphs. [15 refs.]

Nauru or Pleasant Island was annexed by Germany in 1888 and since 1920 has been governed by the Commonwealth of Australia under mandate. It is just south of the Equator at 167° E., lying west of the Gilbert Islands; its circumference is 11 miles. This little coral island is inhabited by 1,500 Nauruans, 140 Europeans and some 900 Chinese. The account here concerns the Nauruans. The topography and climate are described, the average rainfall is 85 inches.

Filariasis.—The blood of 354 Nauruans was examined, fresh and stained, night and day, for microfilaria; 36·1 per cent. of night bloods were positive and of 25 of these examined at mid-day all were negative. The embryos were identified, by comparison with stained specimens, with *Mf. bancrofti.* We are reminded that in Fiji this worm is non-periodic. Twenty-five persons were found to have elephantiasis, in all but one affecting the scrotum or legs. Crushed specimens of *Culex fatigans* showed living filarial embryos. Purulent myositis is not rare; there seems no explanation, says the author, other than filariasis.

There are no anophelines and consequently no endemic *malaria.* The mosquitoes present are listed as *Culex fatigans, Culex quinquefasciatus, Stegomyia fasciata, Aëdes argenteus* [clearly two sets of brackets have been improved away by the printer].

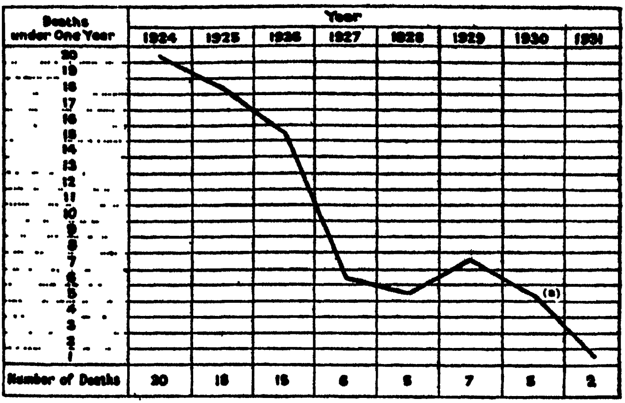
Leprosy was introduced in 1920, spread rapidly, and by prompt measures was brought under control [see this *Bulletin,* Vol. 27, p. 997]. Every six weeks every Nauruan is examined for signs of leprosy. The graph shows the rapid increase and gradual decline.



Graph showing incidence of leprosy (number of patients in segregation) on the Island of Nauru from 1920 to 1931.

Hookworm.—Eighty stools were examined; none showed worms or hookworm ova. "The methods used were diagnosis by vermifuge, plus diagnosis by Barber's glycerine-saturated salt method."

Baby clinics have been established in five of the native districts and babies up to 2 years of age are weighed weekly. BRAY's mixture of yeast from toddy and cod liver oil is administered [*loc. cit.* Vol. 25, p. 869]. The graph shows the course of the infant mortality; the check in the descent of the curve is put down to temporary disuse of the emulsion. The average number of births per year is 60; the maternal mortality for the last five years has been nil.



(a) Includes twins prematurely born

Graph showing infantile mortality on the Island of Nauru. [Note how the fall in mortality was checked in 1929 when the use of Bray's emulsion was suspended.]

[Reproduced from the *Medical Journal of Australia*.]

Of the 25 Nauruan deaths per annum 14 of 24 in 1931 were due to *tuberculosis*.

Fourteen natives have paralysis due to an epidemic of poliomyelitis in 1910. *A. G. B.*

KIRK (J. Balfour) & ANDRÉ (J. Hermann). **Medical and Sanitary Notes on Rodrigues.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Mar. 23. Vol. 26. No. 5. pp. 449–466. With 1 map.

Rodrigues is a dependency of Mauritius, lying 350 miles to the eastward. It is hilly and has an area of 42 square miles. The authors visited it on separate occasions and spent in all 15 days there. The average temperature is 76·9°F. and the rainfall 44·5 inches. The population has grown from 200 in 1825 to 3,162 in 1901 and 8,202 in 1931. The great increase is due to immigration from Mauritius as well as natural increment. The people are Africans with an appreciable European mixture and form two distinct racial groups. Their physique is much superior to that of the Mauritians, which may be due to the absence of malaria or the different diet. The Rodriguean lives on his own produce with maize as staple, the Mauritian on imported rice. Details are given of the language, habits and clothing, occupation, dietary, housing and villages, communications and administration. It is a relatively isolated community. Sanitation is primitive but there are no outbreaks of water-borne disease.

Communicable diseases.—A hookworm survey was made by G. G. HAMPTON in 1922. His table, reproduced, shows that of 393 persons, from every part of the island, examined 123 or 31 per cent. were positive for ova. No special part of the bush is reserved for defaecation, so that the chance of reinfection is not great. Hookworm disease has not yet manifested itself. In 39 stained films of faeces *E. histolytica*, *E. coli*, *Giardia lamblia*, *Endolimax nana* and *Chilomastix mesnili* were identified at the Mauritius laboratory. Kirk examined 84 evening bloods for microfilaria; all were negative.

Leprosy was introduced by one Diango from Mauritius between 1870 and 1880. In 1920 Dr. MANGENIE recognized 23 lepers, descendants of the first family affected or of Diango and in 1926 46 lepers had been discovered. In 1930 André, as a specialist officer, visited the island. He spent 6 days examining all known cases and 580 school children all of whom were free from the disease. A table is given of the 20 cases examined by André. The authors write :—

> "The general outlook as regards this disease is by no means alarming : it is almost reassuring. The tendency of the Rodriguean to prefer his own hut, the difficulty of communications, the freedom from intercurrent disease, the general health of the people and their interest in the disease all tend to operate in favour of its disappearance at no very distant date."

Tuberculosis incidence was tested by the intradermal injection in the skin of the forearm of a dilution of Koch's old tuberculin, the same material and method as was used by Peter ALLAN in the Transkei Territories [see *Bulletin of Hygiene*, Vol. 7, p. 596]. The results in the 655 persons tested are recorded in four tables The numbers, which are small, give the unexpected result of a lower percentage of positive reactions in Eurafricans than in Africans. The authors conclude that Rodrigues cannot be regarded as severely tuberculized, and that the outlook is not bad.

Malaria in the absence of Anopheles is unknown. The distance from the shore at which ocean going steamers must anchor, and the generally prevailing wind are good barriers against anopheline importation. [MACGREGOR (1924) strongly condemned a proposal, for the avoidance of lighterage, to build a jetty from Port Mathurin to the edge of the coral reef.]

The vital statistics of the island for 1929–31 show a death rate of 13 to 15, and a birth rate of 40 to 47. The infant mortality rate, except in 1931, is below 100. *A. G. B.*

LATHAM (D. V.). **The White Man in East Africa.**—*East African Med. Jl.* 1933. Jan. Vol. 9. No. 10. pp. 276–282.

This article deals partly with physiological changes at high altitudes and partly with practical problems in East Africa such as the management of pregnancy and the white child.

The author is concerned with the white population at 4,500 feet and over. He notes that whereas the tropical ailments diminish with altitude the psychological changes increase as atmospheric pressure diminishes. It is the combination of proximity to the equator and altitude which gives the East African highlands their special character. He considers mountain sickness, the pulse-rate, anoxaemia, noting the fact that the death rate from pneumonia at the South African mines at 6,000 feet is much higher than at sea level, effect of high altitude on the mental faculties in reference to neurasthenia [but is this any less common at sea level ?], increase of red corpuscles with altitude, recording that in a Kilimanjaro ascent in 1926 he found the red cells as numerous at 11,500 feet as they were in the Everest climbers at 15,600.

In regard to the white women he finds it hard to predict the date of confinement, drug induction is rarely successful and he holds that an attack of malaria in the pregnant woman is far more dangerous than over-large doses of quinine. He notes the frequency of post-partum retroversion of the uterus and its curability in its early stages. He thinks post-partum haemorrhage is more common than in England. He discusses the feeding and management of the baby. Finally he expresses the opinion :—

> " It is doubtful if a community will ever be able to overcome the added trials of the sun and the altitude in a country where communications are rapidly improving and the strain of a competitive life is daily approaching that found in more temperate climates." *A. G. B.*

BLACK (Kenneth). **Health and Climate with Special Reference to Malaya.**—*Malayan Med. Jl.* 1932. Dec. Vol. 7. No. 4. pp. 99–107. With 1 folding map. [11 refs.]

The author opens with a discussion of HUNTINGTON'S findings* and reproduces that author's map of the distribution of human health and energy on the basis of climate [see this *Bulletin*, Vol. 17, p. 345]. From such a map he thinks governments and commercial firms can tell with some degree of accuracy the differences between the various countries from the point of view of physical and mental energy combined with physical and mental good health. Terms of leave are then considered and it is noted that compared with Tropical Africa and the Sudan the leave terms of Ceylon and Malaya are poor, furlough being granted at intervals of 3–5 years. It is the accepted view, the author believes, that physical and mental deterioration take place in all tropical countries and he discusses these forms of deterioration in turn.

As an instance of the former he states that whereas in England presbyopia becomes manifest at about 45 years, in tropical races it occurs at about 35, and ophthalmologists in the East find that in Europeans long resident there it comes on sometimes as early as 38. The same is true he states of senile cataract. On mental deterioration he cites the experience of the Dutch East Indies. In 13 consecutive years (1919–1931) of the total number of European Government Officials sent on sick leave to Europe the average proportion of those suffering from neuroses and psychoses (army and navy excluded) was 50 per cent. Suicide, again, which occurs in England at the rate of 110 per million (1929), in Singapore Europeans in the last eight years has averaged 233. Mr. F. G. BOURNE, the Singapore coroner, places sex and alcohol low among the causes.

In the author's experience missionaries in Malaya rarely get " nerves " though they stay out for years and often for life, and he suggests that the man whose life is full, who has many and varied hobbies and interests is better able to face the disappointments of life. He refers to the value of hill stations and the cooling of rooms. Bedrooms should have cubicles fitted with electric refrigerators, ensuring sleep at a low temperature. Returning to the leave question he expresses the opinion that the maximum tour in Malaya should never exceed three years without a vacation in Europe ; efficiency, mental equilibrium and alertness will thus be preserved.

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* In " Civilization and Climate "—Oxf. Univ. Press.

[Missionaries have not always been so free from "nerves." G. Basil PRICE in 1913 showed that of 203 invalided from India the cause in 20·6 per cent. was "nervous conditions of a neurasthenic type," of 203 from China neurasthenia accounted for 25 per cent., and of 134 from Africa 20·8 per cent. (*Brit. Med. Jl.* 1913, Vol. 2, p. 1290).]

A. G. B.

CHAMBERLAIN (Weston P.). **The Medical Activities of the Panama Canal.**—*Milit. Surgeon.* 1933. Feb. Vol. 72. No. 2. pp. 108–124. With 1 chart & 2 figs.

The great object-lesson, the sanitation of the Panama Canal, has frequently figured in this *Bulletin*, *e.g.*, Vol. 25, p. 910, and Vol. 28, p. 770, the last article being similar to that now under review. Here we concentrate on the prevention of malaria which after all is *the* problem of most tropical countries. Colonel Chamberlain writes :—

" To free the entire Canal zone from malaria would be prohibitively expensive and no attempt has ever been made to accomplish such freedom. Our anti-malaria efforts are confined to the *vicinity of the more important towns, within which nearly all of the employee population is concentrated.* (Italics in original.) Residents of the Canal Zone not connected with the Government, such as native farmers, are required to live at least one mile beyond the borders of the sanitated towns."

He goes on to point out that the methods of attack on malaria have changed as time went on :—

" Clearing away grass and jungle as a health measure was wisely abandoned about 12 years ago ; it is now well known that shade provided by vegetation prevents the breeding of some dangerous species of anopheles and that removal of vegetation will often result in the development of malaria-carrying mosquitoes in pools or streams where only harmless ones had bred before. Larvicides are employed to a less extent each year and their use is now mainly confined to *bodies of water which cannot be obliterated.* Fuel oil has replaced other chemical agents because of its cheapness, its ease of application, and its effectiveness against *all* species. Paris green is used to a limited extent in a few areas. Preliminary treatment of every malaria case *in hospital*, together with *prolonged compulsory after-treatment* is insisted on for the protection of both the patient and the public.

" Under the more stable conditions existing since completion of the Canal in 1914, increasing emphasis has been laid upon the *final obliteration of mosquito-breeding areas by means of permanent drainage.* . . .

" In all of the more recent drainage programs carried out by the Health Department of the Panama Canal the first step has been to map out each main line or lateral and then to plot the gradients on cross-section paper after survey of the terrain with a wye-level. These two procedures are for the purpose of obtaining the best available flow throughout the entire system, and such preliminary study is especially important when the land to be drained is nearly flat. Wherever conditions are suitable, the installation of rock-covered subsoil tile pipe is the method of choice for permanently drying up a breeding area. A grade of at least four feet in a thousand is essential for proper operation of a tile system. The tiles used are one foot in length, either six or eight inches in diameter, and are made of concrete in the Health Department Tile Plant. They are placed loosely end to end in a narrow trench about two feet deep, which is then filled with broken rock. Tiles laid in this manner rarely become obstructed by roots or silt, even after many years, and practically no upkeep is necessary.

" Concrete-bottomed open drains are made by installing in the bottom of an earth ditch a series of precast concave sections or inverts laid accurately to grade. These inverts are manufactured in the Health Department

Tile Plant, being three feet long with a hemi-cylindrical channel fourteen inches across; they have interlocking male and female ends. As compared with a simple earth ditch the concrete-bottomed drain takes off the water more rapidly and completely, is easier to clean, and is less expensive to maintain. It operates satisfactorily on terrain where the grade is too flat for the use of subsoil tile. . . .

" Permanent drainage works represent a considerable capital investment, but are economical in the long run because the upkeep is much less than is the case when simple earth ditches or larvicides are relied upon. Furthermore, the probability of complete mosquito control is greatly enhanced when permanent drains have been installed."

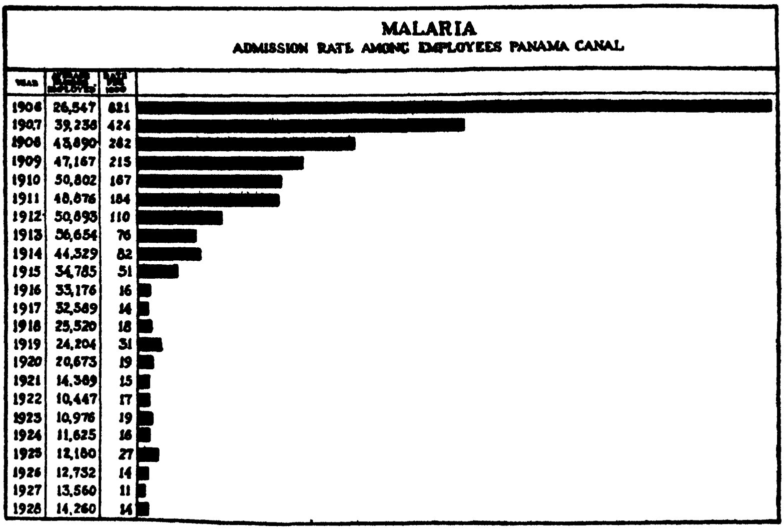

Chart showing reduction in admission rates from Malaria among employees of the Panama Canal and Panama Railroad between 1906 and 1928.

[Reproduced from *The Military Surgeon.*]

During the period 1926–1928 approximately 110,000 dollars (£22,000 at par) per year were spent on anti-mosquito work for the prevention of malaria, a large part for permanent or semi-permanent drainage systems. The chart shows the reduction in malaria. *A. G. B.*

War Office. **Report on the Health of the Army for the Year 1931** [Fawcus (H. B.), Director-General, Army Medical Services].—pp. iv + 158. With 5 charts. 1933. London: H.M.S.O. [2s. 6d.]

This is an informative report. The following account is restricted to the health of the army abroad and chiefly in India (pp. 89–126).

India.—The average strength was 2,319 officers and 55,842 other ranks. The principal causes of sickness in officers were, in order of prevalence, malaria, sandfly fever, inflammation of areolar tissue, dysentery, tonsillitis, diarrhoea, influenza. In soldiers malaria easily heads the list with 6,282, followed by other diseases in almost the same order, except that gonorrhoea comes fifth. An increase of 2,250 admissions was chiefly due to a mild type of influenza (1,560 cases). There were 160 deaths or 2·87 per mille. The chief causes of invaliding were, inflammation of middle ear, pulmonary tuberculosis, epilepsy and dementia praecox.

Principal Diseases—*Dengue and sand-fly fever.*

Sand-fly fever is a disease of the comparatively hot and arid areas of the North-West Frontier and Northern Punjab and shows a tendency to occur in two waves, April–May and July–August; the second wave may be due to the return of susceptible persons from the hills. A mean 8.0 a.m. temperature between 70° and 90° is associated with increased incidence of the disease; rainfall and relative humidity show no such correlation. Difficulty of diagnosis complicates such a study, confusion with influenza and malaria being easy. "No really effective methods of prevention have been devised."

Pyrexia of Uncertain Origin.—202 cases were reported. They were classified as "long" and "short." The "short" fevers presented no symptom or sign on which a classification could be based. The "long" fevers were carefully studied and all possible tests were made. The only fact ascertained was that a certain proportion are intestinal in origin.

Enteric fevers.—Of 493 cases occurring among British and Indian troops 254 or just over half were diagnosed by isolation of the specific organism; the remainder were classified as "enteric group." A table shows that 80 per cent. were diagnosed by blood culture, 25 per cent. would have been diagnosed by faeces culture alone and 7·5 per cent. by urine culture alone. Of the 195 positive blood cultures 153 were diagnosed on the first culture and 36 on the second. Faeces culture was disappointing. It is noted that enteric fever in epidemic form has almost ceased to exist; with the exception of 4 outbreaks of 10 cases or less, all were sporadic and acquired from contact with civilian sources of infection. Of officers 94·5 per cent. were protected by inoculation, and of other ranks 98·7 per cent.

Among the protected there were 2·8 per cent. of cases and 0·2 per cent. of deaths;

among the unprotected 10·5 per cent of cases and 0·59 per cent of deaths.

This from an average of the two half-yearly returns.

Dysentery, diarrhoea and hepatitis.—The rate per mille for dysentery, diarrhoea, colitis and hepatitis + liver abscess was 28·5, 15·4, 0·3 and 1·5. The following is an analysis of the types of dysentery found in the 1,593 cases occurring among British troops:—

	Number.	Per cent.	
Protozoal (*E. histolytica*)	189	11·9	
Bacteriologically proven	638	40	64·05
Bacillary exudate (no dysentery bacilli isolated)	383	24·05	
Clinical	383	24·05	

Figures are given for the several types of bacillary dysentery. Polyvalent high potency (double strength) antidysenteric serum "Hoechst" has been very favourably reported on for treatment and arrangements have been made to maintain a stock of this serum. One death from dysentery occurred. The examination on enlistment of cooks, waiters, water-carriers, bakers and dairymen continued. Dysentery bacilli were isolated from 64 persons and *E. histolytica* cysts from 460, a carrier percentage for the latter of 3·15. In most cases the season of greatest incidence was the fly season; in others dust was suspected. Of hepatitis 71 cases were regarded as amoebic in origin and all responded readily to emetine; in 11·3 per cent., however, there was a history of previous hepatitis, indicating the necessity for more thorough treatment.

Malaria.—The incidence varied from 140·8 per mille in the Western Command to 66 in the Burma District; for all India it was 112 per mille. The varieties when a microscopical diagnosis was made (fresh cases) were 2,470 B.T., 849 M.T., 28 B.T. + M.T. and 17 Quartan. Of 6,282 cases only 466 were diagnosed as clinical malaria, *i.e.*, were incompletely diagnosed. An outbreak of 25 fresh cases occurred in Wellington, a hill-station hitherto considered free; *A. maculipalpis* is believed to be the carrier. An investigation showed that the amount of missed malaria cannot exceed 1 per cent. of the total admissions. A study of albuminuria in hospital cases showed that this symptom is due to the febrile condition and not to the quinine, and that it is transient and of no clinical importance.

An attempt was made to determine the minimum effective dose of plasmoquine. In Poona 325 cases were treated with 0·03 gm. for 10 days, followed by 0·02 gm. for 11 days, plus 20 grains of quinine daily; the relapse rate was 2·8 per cent. A few cases were successfully treated with atebrine.

There is matter of interest under antimalarial measures which does not lend itself to summary. The measures include treatment of the sick in neighbouring villages and village antimalaria gangs (at Kohat), a weekly "dry day" for all artificial collections of water, varying treatment of nullahs according as they maintain a continual flow of water or are dry except after rain. Fumigation has been abandoned. Spraying is resorted to in exceptional circumstances; the factors to be considered are the rate at which barrack rooms become reinfested with mosquitoes, whether the mosquitoes remain in the room after biting, the mosquito population of the room in the day time, the possibility of dealing with breeding places, the extent to which infection takes place outside barracks. Two sets of experiments were carried out on the efficiency of various insecticide sprays with results which are tabulated.

Ophthalmology.—The controlled enlistment of trachomatous recruits into the Indian army has developed into an investigation into the nature and extent of the disease in northern India. It was found that over 90 per cent. of Sikhs are infected, that infection starts in childhood and progresses as a rule to a quiescent stage which produces little disability, and that there is no evidence that the disease is so infectious as to make these men dangerous either to their fellows or to British units. 621·trachoma recruits were enlisted in the year.

A. G. B.

MOUCHET (R.). **Medical Assistance to Natives, with Special Reference to the Belgian Congo.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Dec. Vol. 9. No. 9. pp. 246–257.

An interesting address on this important problem which, as the author says, cannot be solved by the medical department alone. We give one extract:—

"A quite recent experiment was begun on July 1st, 1931. Over the space of half the district of the Lower Congo (about 3 sq. degrees, 14,500 square miles), 10 doctors, 11 sanitary auxiliaries in the Government service, helped by four doctors from religious missions, and 26 missionaries both Catholic and Protestant, were sent out to the villages. One hundred and ten native attendants are under their orders. The whole of this staff is in addition to the number of doctors existing in the centres, to which, moreover, the surgical cases are eventually sent.

" 355,855 natives have been examined, and 200,000 patients treated, including 23,232 for yaws, 242 for syphilis, and 12,182 for ulcers.

" Since the 1st of July this organization has been spread over the whole of the district of the Lower Congo, with an effective of 16 doctors, 17 sanitary auxiliaries of the State, without counting the missionaries.

" This plan, which constitutes the maximum of assistance to the natives, is perhaps slightly premature. However, it will be most interesting to see the result of this vast experiment.

" From the experience gained, we can establish with certainty the necessity in the tropics of establishing a system of social medical work, which, without neglecting the interests of each individual patient, yet first bears in mind the interests of the community." *A. G. B.*

AIRD (Robert). **Notes on Tropical Diseases sometimes seen in Home Practice.**—*Glasgow Med. Jl.* 1932. Oct. Vol. 118. No. 4. & 1933. Mar. Vol. 119. No. 3. pp. 254–265; 82–86.

A didactic article for the general practitioner at home. The diseases described are malaria, kala azar, amoebic dysentery, bacillary dysentery, sprue, trypanosomiasis, undulant fever and helminthiasis, especially schistosomiasis. The author's experience was acquired at Hankow. *A. G. B.*

HARLEY (G. W.). **Ganta Dispensary Patients. A Statistical Study of 6,291 Consecutive Out-Patients in Northeastern Liberia.**—*Amer. Jl. Trop. Med.* 1933. Jan. Vol. 13. No. 1. pp. 67–96. With 2 figs.

An account of dispensary work at a pioneer mission station in North Eastern Liberia during 3½ years, with 14 tables.

A charge of one shilling was made for treatment; this may be regarded as a primitive health insurance because it covered treatment, if need be, for three years. Leprosy alone was treated gratis. The group includes few children and almost no infants, and also few old people. The reputation which Ganta acquired for the cure of yaws served to concentrate cases of the disease from a wide area. A table of age and sex distribution shows that the sexes were approximately equal and half the patients between 20 and 40 years. An elaborate table gives the complaints and the patients' own diagnoses for each sex in the several decades; " general bone pains " was by far the commonest complaint, followed by " sores " and " headache." It is stated that the native has considerable appreciation of disease entities and that in the group of 138 lepers all but two had correctly diagnosed their condition. Another interesting point is that, yaws in the granuloma stage being known as *kala*, to the names for crab yaws, juxta articular nodules, ichthyotic conditions of the hands, and a type of leucoderma the word *kala* was prefixed, evidence in the author's opinion that all these are recognized as phases of the same disease. Other tables show the complaints arranged in order of frequency. The commonest complaints, those of general pains, sores and headache are relieved by bismuth, suggesting a spirochaetal origin. The complaints are discussed. Dysuria, which comes high, was often cleared up by intravenous antimony tartrate.

Except for occasional microscopic examinations diagnoses were made on clinical grounds. Three tables deal with these. "Treponematosis" was diagnosed in 5,598 instances out of 8,003 diagnoses, 89 per cent. of cases; the great bulk of it yaws. Other entries are intestinal parasites (not often looked for) 411, schistosomiasis 248, hernia 170, leprosy 142, crab yaws 137, gonorrhoea 112, secondary yaws 110; and, below this line, gangosa 78, ulcerating granuloma 77, goundou 44, tropical ulcer [very low] 34, elephantiasis 30, interstitial keratitis 25, trypanosomiasis 12. Another table, which is of some interest, arranges the diagnoses according to age incidence. A summary of stool examinations gives 117 cases of *Schistosoma mansoni* infection, 24·6 per cent. of those examined who complained of abdominal pain. The total of hernias, 582 [which however includes 18 hydroceles] is 9·24 per cent. of the whole series. Another table gives the tumours met with. A figure shows the ratio of males to females in the various diseases. The chief diseases of male preponderance are ulcerating granuloma, trauma, heart failure, central nervous system treponematosis. The conditions incident chiefly on females are—schistosomiasis, goitre, keloid and intestinal parasites: the first is explained by the habit of the women of standing in the water washing clothes.

A. G. B.

MACARTHUR (W. P.). **The Teaching of Tropical Medicine.**—*Brit. Med. Jl.* 1933. Jan. 28. pp. 156–157.

We make two extracts from this valuable address:—

"It has long been my belief that the standard of knowledge in general medicine is lower to-day than it was when I qualified. Some time ago I had an experience which confirmed this impression. It fell to my lot to examine a number of recently qualified medical men representing many of the teaching schools. Having a clear recollection of the examination in clinical pathology which I and my fellows had passed in order to qualify, I subjected this group of men to an identical test, and of over a dozen only two came up to the standard which was expected, and obtained, in my time. The lack of knowledge shown by some was deplorable . . . a considerable number of those commencing a course in tropical medicine literally do not know how to use a microscope, and ought to be excluded by imposing a simple preliminary test, if monetary and other considerations permitted."

"In the teaching of parasitology, the course should be restricted to essentials, for the time allotted is necessarily short, and those undergoing instruction tend to be overwhelmed with masses of information new to them, and so fail to sift out and grasp the points of basic importance. It is absurd to expect a class to know the characters of, say, one of the less common intestinal flagellates when they can still be shaken in their identification of a malaria parasite. I remember one examination candidate who himself introduced a discussion on the ova of some of the rarer helminths of man, on which he discoursed with unction. Then, being given a microscope and a faeces preparation, he carefully selected a bit of vegetable débris and identified it as an egg of, I think, *Trichostrongylus colubriformis*. That is tropical medicine upside down." *A. G. B.*

BOMBAY. **Report of the Haffkine Institute for the Year 1931** [TAYLOR (J.), Director].—72 pp. With 1 chart. 1933. Bombay: Govt. Central Press.

The report deals in the usual way with the routine and research activities of the staff. Scorpion venoms formed a special subject of study. These venoms are very complex and consist of neurotoxins, haemolytic and leucolytic substances, coagulants, lecithin, cholesterin, a cardiac tonic and a vascular tonic. They resemble snake venoms closely. Much work has been done on a biological method for the standardization of antiplague vaccine in which white mice are the animals used. Five animals, over 3 months old and weighing between 20 and 30 gm., are used for each dose of the test vaccine. The minimum dose required to protect against 0·5 cc. 1–500,000 dilution of a 48-hr. broth culture of a strain of *Past. pestis* of known and maintained virulence, grown at 27°C., is taken as the measure of potency of the vaccine. This test dose contains about 100 organisms and is injected 10 days after the protecting vaccine. It is interesting to find that one brew of the Bombay vaccine and one of the Lister Institute vaccine protected in a dose of 0·007 cc., whereas the other vaccines tested required a dose of 0·1 to 1 cc. or more. Every brew of the Bombay plague vaccine has given complete protection with a dose of 0·03 cc. per animal. This biological method of testing, of which fuller details are given, is also being used to test the immunity of rats from different towns in India. The marked difference between Bombay and Madras rats has long been known. Another piece of research has been the establishment of an easy means of differentiating *Past. pestis* from *Past. pseudotuberculosis rodentium.* 'A 1 mm. loopful of a broth culture of plague is diluted in about 10 cc. normal salt solution. When 1 mm. of this dilution is inoculated on a blood agar slope and a 5 mm. loopful on "standard agar" [presumably the usual agar of the Bombay laboratory, made from an acid digest of mutton], only discrete colonies appear on the blood agar and no growth at all on the standard agar. This is in marked contrast to the pseudotuberculosis organism, where the growths in both cases are abundant or confluent. "This test brings out the fact that *B. pestis* requires blood or serum . . . . for its optimum surface growth while *B. pseudotuberculosis* does not." Antiplague serum and its concentration is another of the subjects of plague study. In an appendix to the report the standard tables approved for use in India of the statistics of antirabic inoculation are set out.

W. F. Harvey

FEDERATED MALAY STATES. **Annual Report of the Institute for Medical Research for the Year 1931** [KINGSBURY (A. Neave), Director].—126 pp. 1932. Kuala Lumpur: F.M.S. Govt. Printing Office.

This is an interesting record of investigations which have been pursued with success in many fields of research, notwithstanding the heavy calls made upon the staff by a great mass of routine work. Here one can only summarize some of the more important sections.

Tropical Typhus.—This disease is becoming more common and more deadly; 220 cases were diagnosed during the year, and whereas death was a rare occurrence nine years ago when the disease first appeared in the country, the case mortality in 1931 was about 12 per cent. It is spreading gradually from its endemic foci; it has appeared on an oil-palm plantation where it had not occurred before, and it is becoming more frequent on rubber estates. In the days of prosperity, the rubber estates were clean-weeded, but this practice has been largely abandoned, and the increase of tropical typhus is attributed to the cover-crops and secondary growth which spread over the surface of the soil and offer good protection to the rodent hosts of the virus. On one estate, the disease appeared at a time when it was invaded by a swarm of squirrels, and it is suggested that these rodents may serve—like rats—as carriers of the virus.

An important event recorded in the Report was the isolation of a *Proteus* strain, apparently identical with XK, from the pus of an empyema. It was agglutinated by the serum of patients suffering from tropical typhus, and by the empyema patient's own serum; the patient himself gave a positive Weil-Felix reaction at 1 in 280, XK.

Another important advance was the establishment of passage strains of the virus in guineapigs. Former attempts had failed because only 11 per cent. of normal guineapigs react to inoculation but, by feeding them on a vitamin-deficient diet, Dr. LEWTHWAITE has increased the proportion of susceptible animals to 70 per cent. (reacting with scrotal swelling and fever). He has established three strains, one of which is in the twelfth generation. He has also found that the intraocular inoculation of rabbits, with either guineapig virus or infective human blood, is followed by a reaction similar to that obtained by NAGAYO in typhus exanthematicus and the tsutsugamushi disease; namely, iritis with clouding of the aqueous and numerous Rickettsia-like organisms in the endothelial cells of Descemet's membrane.

Dr. P. H. MARTIN has made parallel tests of alcoholized suspensions and living cultures of *Proteus* XK in the Weil-Felix reaction. He has found that though the former are satisfactory in most cases, some cases escape detection unless living cultures are employed. The XK strain did not produce indole in 1926, but, on re-examination in 1931, Ehrlich's test gave a magenta colour. As this could not be extracted with chloroform, it was probably not due to indole.

Malaria.—Dr. Richard GREEN has found that most of the commoner Malayan anopheles can be infected in the laboratory, though the majority are apparently harmless under natural conditions. It seems that the reason why most of them are of little epidemiological importance is because they prefer the blood of other animals to that of man. *A. maculatus* is the important carrier, and human blood is found in about 85 per cent. of engorged captured specimens. An outbreak of malaria in a low-lying part of Kuala Lumpur was due to *A. hyrcanus*; 17 out of 300 specimens were found to be infected, 7 of them in the salivary glands.

Clinical or field tests have been made of plasmoquine, atebrin, quinine-stovarsol, malarcan, and other drugs. It was found that quinine-stovarsol was not superior to quinine in preventing relapses, and that it was without action on crescents; it was therefore concluded that there was little place for it in tropical medicine, particularly as it cost five times as much as quinine. Separate reports have been made on the other drugs investigated, and these reports have been summarized in this *Bulletin.*

Melioidosis.—Dr. P. H. MARTIN found, during the course of routine examinations of cerebrospinal fluids, only three specimens with marked eosinophilia, and from each of these *Pf. whitmori* was cultivated. This is the first record of the isolation of the organism from the central nervous system. An organism resembling *Pf. whitmori* was cultivated from the lungs of a domestic pig in 1930; further investigation showed that it was a true strain of that organism. Pigs are resistant to melioidosis, and their natural infection had not been recorded previously. Three strains of *Pf. whitmori* from Java were found to be indistinguishable from strains isolated in the Malay States.

Chemical Division.—The routine work of this division, under Mr. R. W. BLAIR, included more than 3,000 examinations of water, milk and sewage effluents. Among the toxicological investigations there were many cases of poisoning with datura, a drug which is frequently used by thieves to stupefy their victims. There was one case of poisoning with bamboo hairs, and two fatal cases of poisoning by decoctions made from roots supplied by Chinese medicine men. Lead-poisoning in Chinese girls, resulting from the use of certain cosmetics, was reported from Singapore in 1930; consequently, 54 samples of face powder were examined in Kuala Lumpur, with the result that one in four was found to contain lead. An extract of rice polishings for the prophylaxis and treatment of beriberi is prepared in the chemical department, by Jansen and Donath's method. Dr. I. A. SIMPSON has found that samples prepared two years ago show no loss of activity.

Other investigations included the *Schick testing* of 300 Malay school boys. Eight months after the test, 40 per cent. of the positive reactors had become negative, although no cases of clinical diphtheria had occurred either in the school or in the district. The investigation of the comparative failure of antismallpox vaccination in one area was found to be due to a device adopted by the Malays whereby they neutralized the lymph immediately after insertion, with a mixture of salt and the juice of limes. *W. Fletcher.*

COUDRAY (F. E. C.). Dix-huit mois de pratique médicale hospitalière en France en milieu sénégalais. [**Eighteen Months of Hospital Practice with the Senegalese in France.**]—*Arch. Méd. et Pharm. Milit.* 1933. Jan. Vol. 98. No. 1. pp. 37–72.

A diffuse but interesting article on the Senegalese soldiers at Perpignan in the south of France, dealing in detail with pneumonia and respiratory diseases, parasitic infections and mental symptoms.

In pneumonia the author has had remarkable results with Normet's serum, and is a believer in the "fixation abscess." Finding on one occasion that a delirious man was vomiting round worms, the stools of all such patients were afterwards examined and delirium never failed to be associated with the presence of helminth eggs. On the other hand Senegalese who were not passing such eggs never became delirious. The author says he records this for what it is worth. In the parasitic section one man who was cured when his hookworms were found and treated had symptoms suggestive of disseminated sclerosis; another had haemorrhagic pleurisy. A Malagasy with fetid bronchitis recovered completely with emetine injections; he had quadrinucleate cysts in his stools. *A. G. B.*

MARCANDIER & PIROT (R.). Les rats de Toulon et leurs parasites. [**The Rats of Toulon and their Parasites.**]—*Ann. d'Hyg. Pub., Indust. et Sociale.* 1933. Jan. Vol. 11. No. 1. pp. 14–25.

These naval surgeons have studied the parasitic fauna of rats at Toulon, both afloat and ashore and also the endoparasites of the rats.

Ectoparasites of ship rats.—Of 340 trapped rats 233 or 68·5 per cent. were *M. rattus* and 107 or 31·5 per cent. *M. norvegicus.* These proportions held good for all ships under navigation: in training ships the proportion of brown rats was increased owing to contact with the shore. It is held that conditions on board ship favour the black rat. Lice were the insects most frequently met with. *Haematopinus spinulosus* was found 155 times, almost equally on the two species. It does not bite man.

Of fleas *X. cheopis* was commonest. It was found 82 times, 35·2 per cent., on the black rat and 43 times, 40·2 per cent., on the brown, but the *cheopis* index of the brown is the higher. Seldom were more than 2 or 3 fleas found on the same host.

Ceratophyllus fasciatus occurred on the rats 16 times in 340 rats (4·5 per cent.); it must not be concluded that it is rare on ship rats for it must be looked for in the nests: here it was found 11 times in 44 nests, whereas *cheopis* was seen twice only. New-born rats being naked, there is not shelter for fleas on them. *Ctenopsylla musculi* was a rare parasite on rats.

The mite, *Dermanyssus muris,* is often found if ship rats are carefully brushed; it is also present in the débris of the nests; 22 of 44 nests contained them, up to 90 and 100 individuals. The black rat is the chief host, and the mite is most often met with in warm months. It bites man readily. It is never found on new ships or others where the rat population is small.

Ectoparasites of land rats.—Of 126 rats taken in the town all were *M. norvegicus,* and of a dozen from the naval dockyard the proportions of the two species were equal. Parasites were found on 132 rats in the following proportions:—

	Per cent.
Xenopsylla cheopis, 10 times	7·6
Ceratophyllus fasciatus, 42 times	32·0
Ctenopsylla musculi, 14 times	10·6
Ctenocephalus canis, twice.	
Hematopinus spinulosus, 60 times	45·4
Laelaps echidninus, 36 times	27·0
Dermanyssus muris, 16 times	12·0
Laelaps nuttalli, once.	

Note the rarity of *X. cheopis. Dermanyssus muris* was found only at certain points, such as abattoirs and rag picking establishments.

Endoparasites of Toulon rats.—These consist of *Cysticercus fasciolaris* larval form of a cat parasite; *Protospirura muris* found also in the larvae of *X. cheopis*; *Trypanosoma lewisi* in both rat species, chiefly the black rat, and also in *Dermanyssus muris*; Bartonella and Grahamia; *Spirella muris* the agent of Sodoku. *Hepaticola hepatica* was never found. For details of this section the paper must be consulted. *A. G. B.*

SANARELLI (G.). Sur la pathogénie et sur le traitement des infections dites intestinales. (Rapport introductif.) **[The Pathogenesis and Treatment of the So-called Intestinal Infections.]**—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 121–146.

In this communication the author gives his well-known views upon the mechanism of infection in typhoid fever, cholera, appendicitis and intestinal anthrax, which he does not regard as intestinal infections at all.

The mechanism of cholera infection in man and animals receives the most detailed description. METCHNIKOFF in his classical experiments used suckling rabbits up to the 10th or 12th day of extra-uterine life and could infect them till then with cholera by ingestion. But what is the real explanation ? The digestive canal of these young rabbits is sterile at birth, although already within the first few hours the mouth and pharynx have become invaded by bacteria. Between the 4th and 5th day of life not a single microbe can be found in the duodenum and the small intestine, full of more or less digested milk as they are. Beyond the ileo-caecal valve, however, the contents of caecum, appendix and colon have an abundant microbial flora. These are the first organisms to multiply in the intestinal contents. Similarly with cholera vibrios. They are to be found first, after ingestion, only in the large intestine and not in the duodenum nor in the small intestine where they ought to have been, if they had traversed the stomach. The passage of the vibrios to the large intestine has therefore been an indirect, a parenteral one by way of the circulation and has been facilitated by the fact that the serum of suckling rabbits has no vibriocidal characters. Transported then by the blood stream, they localize themselves in the delicate intestinal walls and develop their toxi-infectious action particularly in the colon and caecum from which they may ascend to the small intestine. By the 10th or 12th day of extra-uterine life alexines appear in the blood, the buccal mucosa ceases to become an easy portal of entry for microbes and the intestinal walls have acquired greater resisting power The young rabbits now no longer develop a true intestinal cholera. Cholera in the adult is produced in the way described. Vibrios enter the general circulation from the tonsillar region, verily a *porta malorum* : their penetration from the surface and entry of the circulation is brought about through the agency of phagocytic leucocytes. One can obtain cultures of vibrios in adults thus orally infected, 24 hours later, in the heart blood and even in the intestinal contents. In adults, however, vibrios may, although definitely enterotropic, produce no action. In animals the secret of successful arrival of vibrios in the intestine is the use of old cultures. Young vibrios are very sensitive to the bactericidal action of the body fluids and ferments. In old cultures there are granules present which are regarded by some as resistant forms of vibrio, the arthrospores of HUEPPE. Young vibrios cannot pass the oral mucosa, but these resistant granules are taken up by phagocytes and " can arrive, without being digested or injured, at their journey's end, that is to say in the intestinal contents." They may have arrived at this situation and by this route, yet do not usually give rise to cholera and this because the enteric juice, although no longer bactericidal to these forms, is still unfavourable to their proliferation. In these circumstances colon bacilli take the upper hand and the vibrios are completely inhibited. The position, however, may be quite other in sensitive new-born rabbits or in adults and cholera may be the result.

The mechanism of the algid stage is also dealt with in detail and is to be explained as an allergic phenomenon. Treatment too, whether with saline purgatives, serums or vaccines, receives an explanation in terms of the described pathogenesis.

W. F. Harvey.

KÄYSER (J. D.). **Valedictory Address.** 1932. Nov. 10. 20 pp. [No place of publication.]

Dr. Käyser has been lecturer on tropical skin diseases at the Leyden School of Tropical Medicine since 1916 and for the 15 preceding years was working as dermatologist at Batavia. The bulk of his address concerns mycology, yaws and leprosy.

Of the yaws-syphilis question he is on clinical grounds a convinced "unitarian." Since 1909 he has been against compulsory segregation of lepers in the Dutch Indies on the grounds of its cruelty and problematical benefit. He believes that the best method of limiting and gradually stamping out leprosy consists in amelioration of the general conditions. He has always allowed married couples to remain together: amongst 45 such there was no single case in which both husband and wife were affected. HANSEN is reported to have said that it was a very puzzling fact that husband and wife very seldom suffered together. He finds a liberal diet and open air life essential and attaches great value to the use of hot baths up to 40° C. (104°F.) as often and as long as can be endured; the absorption of pathological products is increased and the medicine can penetrate better into the diseased tissues. Carbon dioxide snow he finds useful in making small lepromas disappear and for internal treatment he uses chaulmoogra oil in the form of Ol. hydnocarpi exclusively. *A. G. B.*

PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1932. Dec. Vol. 26. No. 2. pp. 167–180 (Sect. of Trop. Dis. & Parasit. pp. 11–24). **Symposium on the Pathology of Buccopharyngeal and Skin Ulcers. Tropical Ulcer: the Distribution of** *Bacillus fusiformis* **and** *Spirochaeta schaudinni* **in the Lesion** [SMITH (E. C.)] pp. 167–172 (11–16). With 8 figs. **The Surgical Aspects of Certain Skin Ulcers** [KILNER (T. Pomfret)] pp. 174–177 (18–21). With 7 figs. **Blastomycetic Ulcers** [CASTELLANI (Aldo)] p. 178 (22). **The Pathology of Oriental Sore and Espundia** [THOMSON (J. G.)] pp. 179–180 (23–24).

E. C. SMITH. With the advent of the Warthin method of silver staining it was thought advisable to reinvestigate the question of the relative positions of the fusiforms and spirochaetes in tropical ulcer. The author notes that it is in the actively progressive lesion of 2–4 weeks duration that a true conception of their relative invasive powers may be obtained.

> "In sections from such a lesion, stained by the Warthin method, the spirochaetes are found invading (to a considerable extent) the granulation tissue at the base of the ulcer. They tend in places to follow the course of the capillary loops of this tissue. Here and there the spirochaetes are found embedded in the delicate walls of the vessels, and they are also found free within the lumina. The malpighian layer of the epithelium, in the neighbourhood of the ulcer margin, is, as a rule, densely infiltrated by the spirochaetes. The fusiform bacilli, on the contrary, remain for the most part superficial, forming a dense 'palisade' or fence-like barrier just deep to the surface of the ulcer but covered more or less completely by a layer of necrotic material heavily infected with organisms of various kinds. This 'palisade' of fusiform bacilli stops short of the epithelial borders of the lesion. Under higher magnification, the bacilli composing the 'palisade' were found to be arranged in closely-packed perpendicular masses."

BROUGHTON-ALCOCK discoursed on the mucocutaneous group of spirochaetes found in varied lesions of the buccal and skin regions, and the question of their pathogenicity.

Pomfret KILNER showed photographic records of ulcer cases, including one of ulcerating granuloma, one of leishmanial sores and one probably leishmanial, in which removal, complete or partial, and Thiersch grafting, with light treatment in one instance, led to complete healing.

CASTELLANI discussed blastomycetic ulcers and J. G. THOMSON the pathology of oriental sore and espundia. *A. G B.*

SMITH (E. C.). **Inoculation Experiments with** *Bacillus fusiformis* **isolated from Tropical Ulcer with Observations on the Bacillus.**—*Jl. Hygiene.* 1933. Jan. Vol. 33. No. 1. pp. 95–102. With 10 figs. on 1 double plate. [11 refs.]

In his first experiments the author had been unable to obtain subcultures of fusiform bacilli from the original growth " in so-called symbiosis with the spirochaetes commonly associated with tropical ulcer." This has now been successful by anaerobic culture of fragments in a medium of the composition, sheep serum 25 cc., agar 50 cc. By the 3rd day the *fusiformis* colonies were recognizable.

Subcultures were obtained by using dwarf test tubes with a small amount of medium instead of full sized ones and a semi-solid medium of the composition, horse serum 25, agar 10, broth 50. Experimental intracutaneous inoculations were made on 8 volunteers and although no typical lesion resembling tropical ulcer was produced they gave rise to considerable local toxic manifestation. In the case of one volunteer motile fusiform bacilli were found in the exudate 14 days after inoculation. No transformation of the fusiform bacilli into spirochaetes was demonstrable in either cultures or experimental lesions. *W. F. Harvey.*

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i. ESLER (A. R.). **Ambulatory Treatment of Ulcer of the Leg by Strapping.**—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Nov. Vol. 9. No. 8. pp. 237–239

ii. McLEAN (N.). **Ambulatory Treatment of Ulcer of the Leg.** [Correspondence.]—*East African Med. Jl.* formerly *Kenya & East African Med. Jl.* 1932. Dec. Vol. 9. No. 9. p. 272.

i. The procedure is as follows :—

" A square of lint covered with Lassar's paste is put over the ulcer, and adhesive strapping is wound round the leg as tightly as possible without obstructing the circulation, from below upwards, extending for two or three inches below and above the ulcer. This strapping is seldom removed now in less time than one month, and may without disadvantage be left on considerably longer. Exudate frequently oozes out from below the edge of the strapping, but this does not indicate delay or cessation of the healing process."

Brief notes are given of seven cases in one of which the ulcer measured 4 inches by 2, but it is noted that the bulk of patients do not return. The custom is to admit to hospital only those whose ulcers are foul and whose tissue damage is extensive; others are treated as outpatients from the first. Ulcers of the foot are not so treated.

Cases of ulcer of leg treated in Kericho Hospital for 1931.

Total number of cases treated in hospital	57
Discharged as " cured "	26
Discharged as " improved " or " nearly healed "	31
Total hospital days	2,659
Average stay in hospital	46·1 days

In a smaller series of cases in 1932 the average stay was 16·8 days.

ii. Dr. McLean writes that the above method slightly modified has been employed at the Kyambu hospital with excellent results. It appears that the micro-organisms present in chronic ulcers have little or nothing to do with retardation of the healing process. In the chronic ulcer of the African native, resulting from some trauma, there is chronic irritation with fibrous tissue formation causing narrowing and occlusion of the blood vessels. *A. G. B.*

JAMES (Clifford). **Tropical Ulcers: a Quick and Successful Method of Treatment by Excision and Skin Graft.**—*Lancet.* 1932. Nov. 19. pp. 1095–1101. With 1 fig.

The author, who writes from the Methodist Mission Hospital, Choiseul, British Solomon Islands, says that the outstanding features of ulcers on the island are their obstinate resistance to ordinary methods of treatment and the readiness of the scar to break down. He says also that most subjects have an enlarged spleen and chronic malaria. He treated 45 cases by excision and immediate grafting, with completely successful results—healing in 13 days—in 41. The procedure is described in all its details—the preparation of the patient, antiseptic precautions, excision of the ulcer, application of seed grafts, dressing and after treatment. Advantages of this method are that dormant organisms are removed, that ulcer and scar tissue are replaced by pliable skin, and that little attention is needed after the grafts are applied. The disadvantage is that 11 days in bed are necessary Full details of all the cases are given in a table. *A. G. B.*

NORMET (L.) & HASLÉ (G.). Les ulcères phagédéniques et leur traitement par la vaccination locale spécifique. [**Phagedaenic Ulcers and their Treatment by Local Specific Vaccination.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 366–372. With 2 figs.

These ulcers have been very variously treated and the treatment now advocated is with an antivirus obtained by cultivation of the causative spirilla. The spirilla, after growth for 24 hours in ordinary peptone bouillon, are sown in 5-litre flasks of nutrient bouillon of pH 7·6 and incubated at 37°C. for 21 days. The deposit, formed of spirilla, is shaken up and the contents of the flasks are distributed. This is the vaccine and is subjected to fractional sterilization at 80°C. The ulcer is first cleaned with sterile salt solution and then well rubbed with cotton wool soaked in vaccine. A dressing of the same vaccine is applied and renewed daily. The ulcer becomes an aseptic wound and begins to cicatrize. *W. F. Harvey.*

RONNEFELDT (F.). Das Problem Ulcus tropicum. Fragestellung und Untersuchungstechnik [**The Tropical Ulcer Problem.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Jan. Vol. 37. No. 1. pp. 10–18. With 6 figs.

This paper, from an American Mission station in Liberia, deals with ulcers of many kinds and their treatment.

It includes a description of the way in which a graphic record of progress is kept, by the use of cellophane, coloured inks and a pencil, by which means an accurate comparison of methods of treatment is possible. *A. G. B.*

BOUFFARD. La pneumonie sur les chantiers du chemin de fer " Congo-Océan." Extrait d'un rapport sur la main-d'oeuvre indigène et asiatique. [**Pneumonia among Workmen on the Congo-Ocean Railway.**]—*Ann. de Méd. et de Pharm. Colon.* 1932. July–Aug.–Sept. Vol. 30. No. 3. pp. 569–576.

The author discusses the epidemiology of pneumonia on this railway now under construction in Belgian Congo and recommends prophylactic measures of which these are the chief :—

Whenever cases succeed one another at short intervals or pneumococci are reported in the blood or in liver smears or in cerebrospinal fluid, regard the disease as a septicaemia and transmissible from man to man.

Stop the work of the labourers concerned. Reduce the occupants of bedrooms by one-third if possible.

Watch detachments at work to prevent the wearing of thick clothes when nudity would be the ideal. Avoid any cause of chill. Reinforce individual resistance by a supplementary vitamin-rich ration.

Serve out two tablets of stovarsol, two days running, to occupants of a room where a case has occurred. Use an appropriate vaccine.

A. G. B.

TROWELL (H. C.). **A Clinical Study of Pneumonia among Africans in Nairobi.**—*East African Med. Jl.* 1932. Dec. Vol. 9. No. 9 & 1933. Jan. No. 10. pp. 258–268 ; 294–304. [40 refs.]

This paper treats of the incidence and mortality of lobar pneumonia among Africans at Nairobi, its clinical peculiarities, the cause of death, its manner of resolution, and treatment by intrapleural injections.

The author refers to observations of Wazir CHAND [this *Bulletin*, Vol. 21, p. 846], of VINT [*l.c.* Vol. 27, p. 35] and of GARNHAM and DE SMIDT, who found 17 of 100 cases at Nairobi to be broncho-pneumonia. The author studied 194 consecutive cases in the Native Hospital, Nairobi, from August 1930 to July 1931 and diagnosed six cases of broncho-pneumonia in life, confirmed in 4 by post-mortem. Such an incidence is supported by the post-mortem records for four years. Here lobar pneumonia alone is considered.

Of the 188 cases (nearly all adult males) 39 were fatal, a mortality of 21 per cent., which, the author points out, is similar for the age-period to that of England. He discusses factors in the incidence and mortality finding that poor nutrition, usually accompanied by a palpable spleen, favours increased fatality as does probably anaemia in which the haemoglobin is below 75 per cent. ; the anaemia in question does not seem to be related to malaria or ankylostomiasis. He believes that malaria predisposes to pneumonia and increases its fatality but the evidence is inconclusive. The faeces were in nearly all cases examined for ova; comparison of a table of the results with one of all patients admitted shows a close approximation.

On the Rand and in Panama the highest mortality has been found in fresh arrivals. Here again the evidence shows that it is the newcomer who is most likely to contract lobar pneumonia and most likely to die from it.

Lobar pneumonia at Nairobi runs a similar course to that described in the text-books but has certain peculiarities: the sputum is haemorrhagic rather than rusty, there is a high incidence of jaundice and apical lesions are present in high percentage. For the jaundice it is surmised that the red cells of the exudate are broken up and throw a high strain on the pigmentary function of the liver, in which the healthy tissue is already reduced by cirrhosis [VINT, this *Bulletin*, Vol. 28, p. 842]. The apical pneumonias were 40 per cent. against 13 in adults in Europe (OSLER); this is a distribution such as is found in European children. Searching for an anatomical reason the author found that the African's diaphragm is relatively higher than that of the European adult, resembling in this respect that of the European child. He suggests that this restricts movement at the base of the lungs and directs infection to the more active apical lobes.

It was noted that crisis was the rule in monolobar infection, and lysis in polylobar.

Six pages are devoted to a discussion of intra-pleural injections, the technique and results. It is concluded that intra-pleural injections of a dilute novocaine solution in normal saline as a rule considerably relieve severe pleural pain. *A.G.B.*

RAO (M. V. Radhakrishna). **An Investigation into the Causation of Ascites.**—*Indian Jl. Med. Res.* 1932. Oct. Vol. 20. No. 2. pp. 459–488. [53 refs.]

The record of an investigation of the cause of ascites in 69 patients admitted to hospital at Vizagapatam, Madras, between July 1931 and February 1932.

In a small group of cases of ascites the causation remains obscure even after thorough investigation. MEGAW in 1921 pointed to chronic dysenteric peritonitis as a probable cause [this *Bulletin*, Vol. 21, p. 688]; he suggested that dysentery toxins pass from the bowel to the peritoneal cavity.

Of the author's 69 cases, which are tabulated, 16 were attributed to decompensation of the heart, 10 to kidney inefficiency, 2 and 4 to malignant tumours and tubercle, 21 to portal cirrhosis and 8 to syphilitic cirrhosis, 1 only to chronic peritonitis. Of the cirrhosis cases, in 17 a diagnosis was only reached after complete investigation. The author describes the tests he made and gives a number of tables. Seven of these show the results of agglutination tests with dysentery organisms. No evidence was found that agglutinins occur in a higher proportion in ascites than in non-ascites cases. The author reaches the following conclusions:—

"(1) The results of the investigation into the cause of ascites in this part of the Madras Presidency definitely show that cirrhosis of the liver and decompensation of the heart are the commonest causes of ascites, and do not support the view of Megaw, that 'the commonest form of ascites in India is not due to cirrhosis of the liver but to a fibrosis of the peritoneum resulting from irritation of the peritoneum by the toxins of the bacilli of dysentery.'

"(2) Kala-azar is not seen here and does not play any rôle in the aetiology of ascites.

"(3) Bacillary dysentery is very common and the Flexner group of organisms appear to be the common invaders.

"(4) The rôle of bacillary dysentery in the causation of ascites is discussed. It is shown that 'chronic dysenteric peritonitis' (Megaw) is rare and should not be considered as a 'common' cause of ascites; hepatic cirrhosis is the probable cause even in cases of ascites with previous history of dysentery.

"(5) While positive agglutination tests against the bacilli of Shiga and Flexner point to a previous infection with bacillary dysentery, they fail to prove the aetiologic relationship between dysentery and ascites. A history of dysentery shortly before the onset of ascites is of no particular significance and it should not be taken as a point in favour of 'chronic dysenteric peritonitis' leading to ascites.

"(5) The causes of chronic peritonitis are many and it is not always easy to prove whether the thickening of the peritoneum is the cause or the result of ascites. Even if evidences of bacillary dysentery, recent or old, are present in the intestines, the thickening of the peritoneum cannot be attributed to the dysentery, unless all the other causes for the change in the peritoneum are excluded." *A. G. B.*

CONNOR (Frank). **Splenectomy. Indications and Results with Special Reference to Conditions obtaining in the Tropics.**—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 35–39.

The author points out that there is in India an enormous amount of material awaiting investigation but the necessary co-operation between physician, surgeon and pathologist is lacking. For the surgeon two essential factors are earlier and more accurate diagnosis and a better procedure for dealing with fibrosed spleens with extensive adhesions. After a reference to ruptured spleens, wandering spleens, abscesses, cysts and new growths he combines three tables, dealing in all with 1,275 splenomegalies, from Bengal, Bombay and Rangoon. [These, as the author admits, are not strictly comparable.] The first series was collected by DE, on whose paper the author draws [*ante*, p. 43]. Here there was a series of 54 cases of greatly enlarged spleens none of which were accepted as chronic malaria, but Connor thinks that a certain number must have been of malarial aetiology. He compares this group with a similar one described by HUGHES and SHRIVASTAVA [*l.c.* Vol. 29, p. 348].

In regard to kala azar SHANKS and DE showed that in 23 of 25 cases of parasite-positive enlarged spleens no increase of fibrous tissue was demonstrable; here the question of splenectomy does not arise. After discussing shortly the other series (Bombay and Rangoon) the author says "we are driven to the conclusion that if we are to be guided by these groups of post-mortem findings many of the largest examples of splenomegaly cannot be regarded as post-malarial or post-kala azar conditions." Many progress to a fatal issue and could perhaps be saved by the surgeon. Splenectomy is rare in India owing to the high mortality, which again is due to the low resistance of the patients. It is suggested that ligature of the splenic artery is worthy of trial. *A. G. B.*

PETZETAKIS (M.). A propos de la nature de l'épidémie de Syra. **[The Nature of the Syra Epidemic.]**—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1058–1061. [15 refs.]

A febrile epidemic on the Island of Syra, one of the Cyclades, in 1931, at first believed to be dengue, has much exercised the minds of the Greek doctors ; its bibliography extends to 15 papers. There seems now to be no question that it was leptospiral and the author says that at Athens this is now accepted by all [see this *Bulletin,* Vol. 29, p. 566].

A. G. B.

FITZGERALD (G. H.). **An Outbreak of Exfoliative Glossitis in an Assam Jail.**—*Indian Med. Gaz.* 1932. Oct. Vol. 67 No. 10. pp. 556–559.

An outbreak of irritative glossitis occurred among 400 prisoners in Gauhati Jail, Assam, in 1931-32. About one-third were attacked. Seventy per cent. recovered on a diet from which condiments had been removed and the addition of 1 oz. of yeast daily to the diet raised the recovery rate to over ninety per cent. Antecedent dysentery seemed to play a part in the aetiology. The administration of two drachms of cod liver oil daily for 3 weeks was without effect. The author seems to suspect that the condition has some relation to pellagra. *A. G. B.*

COLLARI (Salvatore). Rapporti tra malaria e tubercolosi dal punto di vista epidemiologico, clinico e biologico. **(Relations between Malaria and Tuberculosis.)**—*Riv. di Malariologia.* 1932. May–June. Vol. 11. No. 3. pp. 308–335. [37 refs.] English summary pp. 413–414. [Summary appears also in *Bulletin of Hygiene.*]

The possible interrelation and interaction between malarial infection and tuberculosis are considered from the epidemiological, the clinical, and the biological aspects. The author's findings are of considerable interest, though naturally in so important a question further evidence, confirmatory or otherwise, will be looked for.

His investigations have convinced him that in the districts he studied (Sardinia) mortality from malaria is progressively diminishing while that from tuberculosis undergoes little change, but where the death rate from malaria is high that from tuberculosis is low [this, of course, is far from showing aetiological interaction] ; malaria mortality is high in infants, low in young adults, the opposite of what obtains in tuberculosis. Clinically, when chronic malaria patients contract tuberculosis, the progress of the latter disease is slow and of the fibroid type, but if a tuberculous subject acquires malaria, there is a tendency to rapid spread of a miliary character. Biologically, he maintains that in a "malarious soil" [tissue] the *Myco. tuberculosis* develops poorly and its virulence is attenuated, possibly because the fibrosis resulting from the malaria presents a resisting barrier to the spread of the tuberculosis process. The antagonism, if any, between the two infections has nothing to do with the processes of immunity.

H. H S.

JETTMAR (H. M.). Beiträge zur Epidemiologie der Malaria und Pest im Fernen Osten. [**Epidemiology of Malaria and Plague in the Far East.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Vol. 127. No. 1/3. Beiheft pp. 178*–184*.

The author, who was employed in the Epidemiological Section of the Nanking Health Office in 1931, studied the epidemics of malaria and plague which at that time ravaged large areas of China. He here gives his personal experiences, and some history, of these diseases.

Malaria.—Malaria was so severe in some districts that it was reported as plague. It was especially bad in the provinces Kiangsi and Honan where two armies confronted one another ; 90 per cent. of cases were subtertian, the rest tertian ; the mortality was about 10 per cent. The rarity of blackwater fever is noted. The species of Anopheles, *A. hyrcanus* var. *sinensis*, is found in hilly country up to nearly 5,000 feet. The neighbourhood of Nanking also is malaria-ridden. Of 370 persons examined by the author 293 were infected, 240 with subtertian, 47 with tertian and 3 with quartan. In Manchuria two large malarial areas, both in the north, are described. The difficulties of combating malaria in China are stressed.

Plague.—There are three active endemic areas in the Far East ; one extending from Transbaikalia into north Manchuria, the second in Inner Mongolia and south Manchuria (Liao Ho basin) and the third to the west of Peking in Shansi, Shensi and Ordos. Part of the second area has changed from a sparsely to a densely populated country, and hordes of rats have accompanied the settlers. The author examined a village here and found that two-thirds of the fleas collected in houses were *X. cheopis* and one-third *Pulex irritans*, and of the *X. cheopis* examined more than three-fourths were plague-infected [actual figures not given]. Most of the inmates of these huts sickened of plague soon after. Another area examined by the author was in the north-west of Shansi. Here the natives dwell in hollows in the steep hillsides, which are infested with rats.

In the discussion the author stated that according to GOLOFF and JOFF plague infected tarabagan fleas (*Oropsylla silantievi*) at a temperature of 0–15° may live and retain infectivity for 358 days. [The longest period mentioned in this *Bulletin* is 206 days (Vol. 24, p. 937). These were suslik fleas.]* *A. G. B.*

NICOLLE (Charles). Deux problèmes nouveaux de diagnostic différentiel, celui des fièvres exanthématiques et celui des fièvres récurrentes. [**Two New Problems of Differential Diagnosis—Exanthematic and Relapsing Fevers.**]—*Bull. Inst. Pasteur.* 1932. Oct. 31. Vol. 30. No. 20. pp. 961–970.

Exanthematic fevers.—This is a natural group the type of which is old-world typhus. The blood in these fevers has agglutinating properties for certain bacteria of the Proteus group, and as pathogenic agents the Rickettsiae. In all forms the carrier is an invertebrate. Exanthematic fevers foreign to Europe and N. Africa are not here considered ; the discussion concerns old-world typhus, benign typhus and eruptive fever (*fièvre boutonneuse*). A doctor on the Mediterranean coast may meet with all three ; how is he to distinguish them ?

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* In Comptes Rendus du Premier Congrès Antipesteux de l'U.R.S.S. (Saratov, 1928) (noticed in this *Bulletin*, Vol. 26, p. 93), a table is given (p. 115) headed "Maximum de conservation du B. pesteux dans les puces," in which this figure occurs for *O. silantievi*, 275 days for *Ceratophyllus vesquorum* and 210 for *C. consimilis* at 0° to 15°. These species all bite man. The survival at 14° to 27° was usually about half these periods.

Clinically, well-marked old-world typhus is readily distinguished from benign typhus by its severity, but it is often well borne by natives of regions where it has raged for centuries, and is always mild in the child. On the other hand so-called benign typhus may have a considerable fatality as is often seen in Mexico. In this variety there is a tendency to haemorrhage, especially epistaxis, which is never seen in old-world typhus. The extension of the eruption, first noted by Nicolle, to the palms and soles in eruptive fever is seen also in Mexican typhus. The tache noir, considered to characterize eruptive fever, is a variable phenomenon, and may be so slight that its very presence is doubted. The clinical differences in fact between benign typhus and eruptive fever may be so slight that diagnosis is impossible.

Only laboratory methods can separate these three diseases; for they show the specificity of the three viruses. The essential fact is that the viruses of the two typhuses (brain of infected animal) vaccinate against one another but not against eruptive fever, and that of eruptive fever vaccinates against itself but not against the typhus viruses ; and another capital difference is that the louse can be infected with the typhus viruses but not with eruptive fever. At first the guineapig and rat were found insusceptible to eruptive fever, but both have now been infected. A distinctive character is furnished by the Weil-Felix reaction ; the agglutinating property for Proteus X_{19} is infinitely less marked with the serum of eruptive fever than with that of either form of typhus ; when eruptive fever is in question it is well to employ X_2 as well as X_{19}. The male guineapig usually reacts differently to the two forms of typhus, but this difference is not invariable. The rat, however, is an animal subject to natural infection and the differences in its behaviour are of importance : with old-world typhus the infection is unapparent and after 12–13 passages dies out ; with the benign virus there is always febrile infection and frequently death in hypothermia ; and passages can be continued indefinitely. The author would re-name the two typhuses historic typhus and murine typhus. Both viruses are pathogenic to the louse, but whilst that of murine typhus develops with such rapidity that lice begin to die on the third day and all eventually succumb, the virus of historic typhus takes 6 days to begin to kill lice and all do not die. The adaptation of murine typhus to the louse is more recent than that of historic typhus. Neither virus, however, affects the well-being of the flea, and both can persist in the flea for more than a month. The flea has preceded the louse in the natural history of typhus.

Relapsing fevers.—There are two forms in North Africa, relapsing fever transmitted by lice and epidemic, and relapsing fever transmitted by Ornithodorus ticks, with little tendency to extension. However a tick-transmitted spirochaete can be equally well transmitted by an Ornithodorus from another part of the world. How are N. African doctors to distinguish these two forms ? Clinically tick-transmitted relapsing fever is very mild, febrile attacks are less definite, shorter and more numerous than in the other form ; the duration is often prolonged. The arsenobenzols are much less active in the tick transmitted fever and the frequency of eye symptoms is greater. On microscopic examination spirochaetes are numerous in the louse form, whereas in the tick form they may be so rare that they cannot be demonstrated.

Again it is in the laboratory that the diagnosis is clinched. The diagnostic animal is the guineapig. Insusceptible or almost so to the louse virus, when inoculated with the tick virus it contracts a relapsing fever, characterized by febrile bouts in which spirochaetes are numerous in the blood. To diagnose the one from the other form of relapsing fever in N. Africa all that is necessary is to inoculate a guineapig, and the author anticipates that when this becomes the practice relapsing fever attributed in Algeria, Lybia and Egypt to lice will often be found to be really the tick form. *A. G. B.*

SPINELLI (Antonio) & REITANO (Ugo). Richerche sulle blatte, quali agenti di diffusione dei germi del colera, della febbre tifoide e della dissenteria bacillare. [**The Cockroach as Transmitter of Cholera, Typhoid and Bacillary Dysentery.**]—*Ann. d'Igiene.* 1932. Nov. Vol. 42. No. 11. pp. 745–755. [11 refs.]

The cockroach has been incriminated as an agent of transmission of disease. Although this insect may be left out of account in modern houses this is not the case with old houses in Rome where it is a pest and very difficult to eradicate. The author's results from feeding organisms to cockroaches may be summed up in the statements that:—(1) The germs of cholera, typhoid fever and bacillary dysentery are capable of surviving in the gastro-intestinal tract for 15, 9 and 6 days respectively. (2) These germs are to be found in the dejecta 86, 72 and 96 hours respectively after the ingestion of the infected food. (3) There is no loss of virulence of the germs in their passage through the cockroach. *W. F. Harvey.*

ROGERS (Leonard). **Result of the Forecast of Cholera, Smallpox and Plague in India in 1932 and Forecast for 1933.**—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 1-3.

In this article there is set forth the outcome of the forecast for cholera, smallpox and plague during 1932 together with the new forecast for 1933. The analysis of the 1932 results shows that the forecast was "the most accurate of the three yet issued, in spite of the well distributed rains of 1931 having made a forecast difficult." Each province is dealt with in detail and the correspondence of calculated with observed data is manifest. The probable issues for 1933 were elaborated in London on 18th November 1932 from the climatic data available up to October. Monsoon rains were well distributed in 1932 with some defect in Bihar, Madras and the United Provinces and an excess in the N.W. Frontier Province and Sind. "These conditions are unfavourable to widespread epidemics of cholera or smallpox in India as a whole, but the comparatively low hot-season temperatures and saturation deficiencies in the Deccan and Eastern Central Provinces favour increased plague there." *W. F. Harvey.*

ISHAK (William). **Bismuth in Furunculosis.**—*Jl. Egyptian Med. Assoc.* 1933. Jan. Vol. 16. No. 1. pp. 97–100.

The author finds bismuth injections curative for boils in Egypt.

During the summer many cases of furunculosis are seen at Kasr-el-Aini Hospital, Cairo. They are frequently resistant to all kinds of treatment, yeast, vaccine, manganese, etc., and linger on till the cool weather comes. The author has tried intramuscular injections of bismuth in 100 cases.

" The bismuth we used was a suspension of finely divided metal in isotonic glucose containing 0·20 gm. of bismuth in 1 cc. of the suspension. The injections were given twice weekly. The dose advised is 0·30 for the adult male, 0·25 for the female, for children of 1–3 years 0·05 and for those above that 0·10 up to the 10th years and 0·02 for each year more."

Many patients did not come back after the first or second injection but of the 52 who were followed to the end only 5 were failures, a cure percentage of 90 per cent.; there were 20 cures after two injections; a few had 5.

After the 1st or 2nd injection the boils were reduced to half or one-third of their previous size; even when pus had begun to form it usually dried up. *A. G. B.*

PERRONE (Luigi). Di un' adatta cura della tossicosi da morso di *Vipera aspis.* **[Appropriate Treatment of Poisoning by an Asp.]**—*Arch. Ital. Sci. Med. Colon.* 1933. Feb. 1. Vol. 14. No. 2. pp. 138–140. English summary (5 lines).

Asp bites are not uncommon in Italy among peasants engaged in mowing, reaping, or other field work. As a rule they are treated by ligature, sucking out the poison, and applying locally calcium hypochlorite, or chloride of gold, or chromic acid, and injecting 10 cc. of 1 per cent. permanganate of potassium; polyvalent serum is used if available.

The case recorded here is that of a youth of 16 years, bitten on the right arm while mowing; a ligature was applied, attempts made to suck and press out the poison and direct cautery (flame) was carried out. Some ten hours later he showed signs of general poisoning, vomiting, tachycardia, drowsiness and oppression. The wound was painful, oedematous, surrounded by bullae with serum, temperature 40·1°C., respirations 31, pulse 135.

The author injected the contents of a phial (5 cc.) of *Septacrolo Ciba* in the deltoid region. Two hours later the temperature was 38·6°C., respiration about normal, pulse 105. Next day the temperature being 38°C. and the condition of the limb as before, another 5 cc. were injected into the deltoid. The same evening the patient sweated, temperature became normal, the local condition was greatly improved and his mind was clear, and after 3 days recovery was complete.

Septacrolo, prepared by an Italian firm Ciba, is a combination of a silver salt with an acridine derivative—nitrate of dimethyl-diamino-methyl acridine—and contains about 22·3 per cent. silver. It is a reddish brown powder soluble in distilled water. It is said to be a powerful bactericide and its injection is followed by marked leucocytosis. It is put up in phials of 1 and 5 cc. for intravenous or intramuscular injection. The author is of opinion that since the symptoms of general toxaemia appeared at so long an interval after the bite the patient would have had small chance of recovery under ordinary conditions and that the effects of the Septacrolo were very striking.

H. H. S.

FANJUL (Luis). Ensayos de vacunación percutánea con bacilo tífico, disentérico y vibrión colérico. **[Percutaneous Vaccination with *Bact. typhosum*, *Bact. dysenteriae*, and *Vibrio cholerae*.]**—*Trabajos.* Madrid. 1933. Jan. 15. Vol. 2. No. 7. pp. 26–27.

In 1931 LÖWENSTEIN demonstrated the development of agglutinins to *Bact. typhosum* in dogs on whose shaved skin killed bacilli had been rubbed. The author, under the direction of Professor LÖWENSTEIN, continued these investigations, using a glycerinated suspension of *Bact. typhosum*, killed by formol, containing 15 " billions " [probably thousand millions] per cc., applied to rabbits and guineapigs. The method of procedure is described :—

Both sides, ventrally and dorsally, the skin was shaved, then lightly scarified with sand-paper, cleansed with ether or benzine. The bacillary emulsion was then applied, drop by drop till some 3 cc. had been used [the dose, 45,000 million, seems very large], absorption being assisted by manual friction ; this was repeated twice at intervals of 7 or 8 days.

A fortnight to three weeks after the third vaccination blood was withdrawn from the heart and the serum tested for agglutinins. Four rabbits' sera agglutinated in dilutions varying from 1 : 1,000 to 1 : 3,000 and four guineapigs in a titre up to 1 : 200.

The organisms of dysentery and cholera similarly applied gave rise to no agglutinin formation. *H. H. S.*

COIA (A. G.). **Some Notes on Nephritis in British Guiana.**—*Brit. Guiana Med. Ann. for 1932.* pp. 45–50.

The author while in charge of the Male Chronic Medical Ward (? at Georgetown) examined 56 cases admitted with the diagnosis, nephritis or albuminuria with oedema ; only 30 turned out to be nephritis when subjected to full clinical and laboratory investigation. Six are described as dropsy of doubtful origin and the question is discussed whether these are cases of beriberi ; if they are, it is difficult to explain why this condition should be practically confined to East Indians. [Epidemic dropsy in Fiji and elsewhere has been attributed to mustard oil, which is in general use by Indians (see this *Bulletin*, Vol. 28, p. 437).] One of the conclusions reached is that nephritis in British Guiana does not differ from that described in other parts of the world, nor is it more prevalent. [The author appears not to have met with the malarial nephritis reported by GIGLIOLI from up-country.] *A. G. B.*

FAIRLEY (N. Hamilton). **Obstructive and Haemolytic Jaundice in the Tropics.**—*Proc. Roy. Soc. Med.* 1933. Mar. Vol. 26. No. 5. pp. 578–583 (Sect. of Trop. Dis. & Parasit. pp. 26–31). [21 refs.]

Dr. Fairley in this paper treats of a subject, perhaps one ought to say, a symptom of great importance in the tropics ; equally so, of course, in temperate climates though the possible causes are fewer. He points out that jaundice of haemolytic origin, of toxic or infective aetiology, is of greater significance to the tropical practitioner than is the obstructive form. It is shown that in many cases where obstruction would be inferred as considerable—parasites infesting the liver, hepatic abscess, etc.—jaundice is by no means a frequent symptom, unless, of course, the parasite, *e.g.*, Ascaris, invades and blocks the bile ducts. The haemolytic form has several varieties, aetiologically : physiological, as in icterus neonatorum ; congenital as in sickle-cell anaemia and in Minkowski's disease; parasitic as in malaria, and Oroya fever; in septicaemia; in some snake poisonings and in megalocytic anaemia.

In order to elucidate the aetiological factor or factors there is need for "careful clinical, pathological and bio-chemical investigation of cases of jaundice met with in tropical practice," which calls for facilities unfortunately rarely available to tropical practitioners and for a standard of academic knowledge only attained by the specialist, though it is but too true, as Dr. Fairley states, that only "along such lines can the present deficiencies in our knowledge be rectified." *H. H. S.*

HECKENROTH (F.) & RAYNAL (J.). Un cas de susceptibilité pour la quinine, difficulté de la désensibilisation. [**Case of Quinine Susceptibility—Difficulty of Desensitization.**]—*Marseille-Méd.* 1932. Dec. 25. Vol. 69. No. 36. pp. 819–830. [14 refs.]

A man of 22 was invalided from Syria for malaria and quinine intolerance in 1931. He was seen in the seventh attack with *P. vivax* in the blood and a pruriginous eruption on the skin following the taking of extract of cinchona the night before. He stated that on landing in Syria for military service he was submitted to prophylactic quininization (25 cgm. of the hydrochloride) and that fever and a red eruption, at first regarded as food poisoning, followed the first dose.

The authors cured the malaria with stovarsol and then attempted to rid the patient of his quinine intolerance. He received increasing doses of quinine at first subcutaneously, then by the mouth, starting with 5 mgm., but the cure had to be interrupted three times, and five months was required for its completion. He now tolerates 1·25 gm. a day without symptoms other than slight peeling of the hands. Peptone was given as recommended by MOLLOW [this *Bulletin*, Vol. 22, p. 993] without apparent benefit. The skin symptoms were severe and special attention is drawn to the changes in the nails, which the authors believe have not been recorded. They are described as yellowish, dry and friable with longitudinal striae and numerous cup-like depressions. *A. G. B.*

MOREIRA (Duarte). Sobre um caso de nevrite toxica do acustico pelo oleo de chenopodio. [**Auditory Neuritis due to Oil of Chenopodium.**]—*Folha Med.* 1932. Sept. 5. Vol. 13. No. 25. p. 291.

The patient was a man of 20 years working in a pharmaceutical laboratory [and, therefore, ought to have known better] who, thinking that he might be harbouring worms, took 20 cc. of oil of chenopodium in a single dose. Shortly afterwards he became pallid, complained of hazy vision and general pains. He was taken home where he vomited and passed into a deep sleep for 11–12 hours. On awaking he was completely deaf, but had marked tinnitus in both ears. Three days later hearing began to come back, but for two years there has remained a persistent buzzing in the right ear.

Examination revealed no defect of the tympanum; there was no vertigo or nystagmus but signs of affection of the VIIIth cranial nerve. The personal history was good, W.R. negative and no cause could be discovered other than the fact of the sudden onset following immediately on taking a large dose of the drug. *H. H. S.*

FRÓES (Heitor P.). Sur un poisson toxiphore brésilien: le "niquim" (*Thalassophryna maculosa*). [**A Poisonous Fish of Brazil: the Niquim** (*T. maculosa*).]—*Rev. Sud-Américaine de Méd. et de Chirurg.* Paris. 1932. Nov. Vol. 3. No. 11. pp. 873–878. With 3 figs.

A clinical lecture. Some account of the fish's habits. No details of the venom or its effects. *A. G. B.*

Ashford (Bailey K.). The Contribution of Hematology to the Diagnosis of Disease-Conditions in the American Tropics.—*Bol. Asoc. Med. de Puerto Rico.* 1933. Jan. Vol. 25. No. 1. pp. 14–17.

Bhattacharyya (Rasamay). Intensive Iron Treatment of Anaemia in a Tea-Garden Labour Force.—*Indian Med. Gaz.* 1933. Mar. Vol. 68. No. 3. pp. 134–135.

Cochrane (E.). Rheumatic Fever in the Tropics.—*Brit. Guiana Med. Ann for* 1932. pp. 92–97.

Finkelstein (M. H.). Recent Discoveries in Virus Diseases of Tropical Climates. *Jl. Trop. Med. & Hyg.* 1933. Mar. 15. Vol. 36. No. 6. pp. 81–83. [12 refs.]

Grantham-Hill (C.). Anaesthesia in Tropical Surgery.—*Lancet.* 1933. Feb. 11. pp. 295–297.

Ito (Yoshio). Zur Kenntnis des Paederusgiftes.—*Fukuoka-Ikwadaigaku-Zasshi* (*Fukuoka Acta Med.*). 1933. Feb. Vol. 26. No. 2. [In Japanese. German summary pp. 20–21.]

Kaufmann (E.). Zur Verringerung von Chininnebenerscheinungen besonders bei intramuskulärer, intravenöser und endolumbaler Anwendung.—*Klin. Woch.* 1933. Mar. 4. Vol. 12. No. 9. pp. 366–367. [40 refs.]

Nájera (Luis). Los arsenobenzoles en la terapeutica de las enfermedades exoticas.—*Medicina Paises Cálidos.* Madrid. 1933. Mar. Vol. 6. No. 2. pp. 81–103. With 13 figs.

Palthe (P. M. van Wulfften). Amok.—*Nederl. Tijdschr. v. Geneesk.* 1933. Mar. 4. Vol. 77. No. 9. pp. 983–991. With 1 fig.

Pervès (J.). Syndrômes péritonéaux chez les noirs (appendicites et fausses appendicites).—*Arch. Méd. et Pharm. Nav.* 1932. Oct.–Nov.–Dec. Vol. 122. No. 4. pp. 465–477.

Themelin (R.). Traitement des dermatoses du type "ulcère tropical."—*Bull. Méd. du Katanga.* 1932. Vol. 9. No. 6. pp. 167–173.

Walker (J. W.). Pregnancy in the Tropics. Should the European Woman Come Home?—*Jl. Trop. Med. & Hyg.* 1933. Feb. 1. Vol. 36. No. 3. pp. 41–42.

REVIEWS AND NOTICES

HENNING (M. W.) [Professor of Veterinary Science in the Faculty of Agriculture, University of Pretoria]. **Animal Diseases in South Africa. Vol. I. Bacterial and Protozoal Diseases.**—pp. xi + 1–405. With 43 illustrations. **Vol. II. Virus and Deficiency Diseases, Plant Poisons.**—pp. x + 406–878. With 84 illustrations. 1932. South Africa : Central News Agency, Limited. [£2. 10s. per set of 2 Vols. from Gordon and Gotch, Ltd., 75–79, Farringdon Street, London, E.C.4.] [Review appears also in *Bulletin of Hygiene.*]

In no country in the world, during the past thirty years, has veterinary science progressed more rapidly and conferred greater benefits on stock-farming than in South Africa. A great mass of knowledge concerning animal disease in the sub-continent has accumulated, but much of it has been rather widely scattered in official reports and journals that in many instances are inaccessible to the majority of students, and to veterinarians working far from a few centres in South Africa itself. For example, the reports of some of the administrative and field veterinary officers, and especially those of the late D. HUTCHEON, contain a large amount of valuable information derived from years of careful observation. The results of the investigations of Sir Arnold THEILER and his staff, carried out at Onderstepoort and in the field, are more readily accessible, but the published work has attained dimensions that render summarization really essential for new workers in the same or similar fields.

Prof. Henning, of the University of Pretoria, has set himself the task of collecting the main facts concerning the animal diseases of South Africa, and of presenting them in a form suitable for the veterinarian and the veterinary student of that country. He has earned the gratitude, not only of those for whom his book is particularly intended, but also of all who are interested in the diseases of animals in tropical and sub-tropical countries.

The work covers a wide field. The first volume is divided into two parts, in the first of which he describes the more important bacterial diseases of the domestic animals. Part II deals with diseases associated with protozoan parasites. The second volume consists of three parts, dealing with virus diseases, plant poisoning and deficiency diseases respectively. The author has been guided in his selection of subjects by the relative importance of a disease to South Africa, and his choice appears to be judicious.

Among the bacterial and virus diseases here dealt with, there are several which are of at least equal importance in Europe (anthrax, tuberculosis, contagious abortion, foot-and-mouth disease and swine fever), but Prof. Henning has included the historical facts and the facts concerning their distribution in South Africa, and any special features seen under South African conditions. The section on poisonous plants is particularly valuable, and its length, which in relation to the other parts is very considerable, reflects the importance of poisonous plants to the South African stock-owner, and the very considerable attention paid to the subject by South African investigators.

The author has covered a very wide field, and in parts he has had to compress a great deal of information into small compass. It is not, therefore, surprising to find that some facts are stated in a rather ambiguous form, and that there are a few definite errors.

The work forms a valuable summary of the main facts concerning animal disease in South Africa, however, and it contains a great deal of information that has hitherto been practically inaccessible to the majority of veterinarians. The book will be appreciated by those for whom it is particularly intended, and we can recommend it to any reader who is interested in tropical veterinary science. The volumes are well turned out, and contain some excellent illustrations. *W. H. Andrews.*

FELDMAN (W. M.) [M.D., B.S., M.R.C.P.Lond., F.R.S.Ed., Senior Physician, St. Mary's Hospital for Women and Children, etc.]. **General Haematology. With Special Reference to the Child in Health and Disease.**—96 pp. With 7 figs. Pocket-Monographs on Practical Medicine. 1933. London: John Bale, Sons & Danielsson, Ltd., 83–91 Great Titchfield Street, W.1. [2s. 6d.]

This little book deals in turn with the chemistry of the serum, the corpuscles, maintenance of corpuscular equilibrium, the platelets, blood diseases, blood in treatment, bacteriology and parasitology of the blood and blood in its biological and sociological aspects. The chapter on bacteriology and parasitology is a short one and the reference to the tropics is so brief that it is quoted here *in extenso* :—" The parasitology of the blood is of very little practical importance in this country. In tropical climates, the parasites often found in the blood are the *Plasmodium malariae* (within the red corpuscles) ; filaria, mostly found in evening specimens of blood ; the spirillum of relapsing fever ; and the various trypanosomes." If a second edition is called for, this paragraph should be re-written, or deleted.

A. G. B.

MEIJERS (Frederik Maurits). **Onderzoekingen over urobilinurie als lever-functie-proef.** [Urobilinuria as Test of Liver Function.] [Thesis for Doctorate in Medicine at Amsterdam University.] —pp. ix + 132. With 12 figs. [2 pages of refs.] English summary pp. 119–123. 1933. Amsterdam: Scheltema & Holkema's Boekhandel N.V.

This work deals with a question of physiological and pathological biochemistry—urobilinuria and its quantitative presence as a test of liver function. The experiments were carried out on Javanese men under tropical conditions but apart from this fact the subject is not one with special tropical application and consequently does not call for detailed review in this *Bulletin.* *H. H. S.*

MODENA, REGIA UNIVERSITÀ DI: **Rapporto sul funzionamento dell' Istituto di Patologia Coloniale. Anno Scolastico 1931–1932** [FRANCHINI (G.), Director]. [Report on the Institute of Colonial Pathology, Modena, for 1931–2.]—80 pp. With 65 figs. 1933.

This is the report on the activities during 1931–32 of the Institute of Colonial Pathology of the Royal University of Modena. It is divided into 7 chapters. The first gives an account of the curriculum and a list of those who took the courses ; the second records the scientific and research activities—mainly determination of blood and faecal parasites and identification of insects—and a list of papers and articles published from the Institute during the year, thirty in number, chiefly helminthological and protozoological. Nearly one-third are by the Director, showing that Professor Franchini undertakes research work in addition to his administrative duties. Chapters III and V give a list of material maintained, parasites living and in culture, etc., and an enumeration of museum specimens—snakes, fish, worms, insects (mosquitos, flies, ticks), scorpions,

drugs and plants. Chapter IV mentions the names of Colonial Medical Officers and others, with their stations, associated with the Institute and its activities. The whole is well illustrated. ***H. H. S.***

VAN NITSEN (R.) [Médecin en chef de l'Union Minière du Haut-Katanga]. **L'hygiène des travailleurs noirs dans les camps industriels du Haut-Katanga.**—[The Health of Negro Workers in the Industrial Settlements of Haut-Katanga.] 248 pp. With 9 charts, 4 figs., 1 map & 7 figs. on 4 plates. 1933. Brussells: Marcel Hayez, Imprimeur de l'Académie Royale de Belgique, 112 rue de Louvain.

This book is reviewed in *Bulletin of Hygiene*, Vol. 8, p. 579.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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MEDICAL EDUCATION IN UGANDA.

By Hugh Brindley OWEN, D.S.O., O.B.E., M.B., B.Ch., D.T.M. & H. (Camb.), D.O.M.S. (R.C.P.S.).

(Formerly Medical Superintendent and Principal, Medical School, Mulago, Uganda.)

(Received July 10, 1933.)

An account of the development of medical education in a comparatively primitive country may be of guidance to those engaged in or starting such work in similar circumstances.

Medical Organization of Uganda.

As a preliminary it is necessary to have an idea of the medical organization of the country in order to understand the aims of medical education and the role its products are intended to play in this organization. For administrative purposes Uganda is divided into districts with British Commissioners and Assistants in charge. A British Medical Officer is in medical charge of each district and is responsible for all medical and sanitary work therein. In certain cases he may be assisted by one or more Medical Officers. He has a district hospital at the headquarters station, and there may be smaller sub-hospitals at other stations in the district. There are also dispensaries at populous centres. Generally speaking the sub-hospitals and dispensaries deal with minor or simple cases, paying special attention to venereal diseases, yaws, trypanosomiasis, etc., and would evacuate to the district hospital cases of a serious or difficult nature requiring special skill in investigation and treatment.

As a rule, at the district hospital, there are one or more Asiatic Sub-Assistant Surgeons, assisting the Medical Officer and taking charge during his absences while touring the district. Sub-hospitals are managed by Sub-Assistant Surgeons also. These officials have received their medical training in India and have Indian qualifications or degrees, except in the case of those who have been promoted from the compounder or dispenser grade. A British Nursing Sister is posted to many of the larger district hospitals, supervising the work of the African nursing staff. The latter are of both sexes, male nurses dealing with the men and female with the women, though it is customary for male nurses to perform special duties, such as the giving of intravenous injections, on the female side.

Historical Review of Medical Education in Uganda.

In the process of describing the aims and methods of medical education something in the nature of a historical review of events will be attempted, as an account of the development of the scheme provides as much, if not more, guidance than an account of the scheme as it operates at the present time.

Real medical progress dates from the conclusion of the war, and perhaps the most eventful change was the conversion of the large venereal unit at Mulago, near Kampala, into a general hospital, for upon this change depended the possibility of initiating medical education.

Concurrently and indirectly equally eventful was the awakening of Government to its responsibilities in the matter of general education, in which it had previously taken no concern, except to give educational grants to missionary societies.

After the war, Government decided to build a college at Makerere, near Kampala, the original conception of which was in the nature of a technical school for the teaching of the crafts, with a section devoted to training of boys as subordinates in the Medical, Agricultural and Veterinary departments. Subsequently a further step was taken and an education department formed. Since then Makerere College has changed its status considerably, the technical side has been transferred to a separate institution, and it now concerns itself only with providing a higher general education, preparing its pupils chiefly for such posts as schoolmasters, clerks, and assistants in scientific departments of Government.

In 1923 I was appointed Medical Tutor at this institution, charged with the duty of undertaking the organization of a scheme of medical education I was, be it noted, attached to the Education Department. The problem at the commencement was what to aim at. A medical school had been in operation for some time at the neighbouring hospital of the Church Missionary Society, where the pupils were taught in the vernacular. I believed that the vernacular was unsuitable for the communication of scientific ideas, and its use would further deny all access to medical literature. Knowing that there were boys at the higher grade schools who had a very reasonable knowledge of English I resolved to use it as a sole medium of instruction.

The objective was the production of an assistant of the type of the Asiatic Sub-Assistant Surgeon, capable of diagnosing and treating the commoner and simpler diseases of the country, able to recognize many of the more complicated conditions, and to appreciate the possibilities of major medicine and surgery in more expert hands.

It was decided to embark on a course similar to that obtaining in Europe, but pruned and simplified greatly to suit local conditions, the local mentality and educational standard.

The original course, introduced in 1924, was as follows :—

First year—Chemistry, Physics, Botany, Zoology.

Second year—Anatomy, Physiology.

Third and fourth years—Medicine, Surgery, Pharmacy, Laboratory Methods.

Although the results were satisfactory in some respects, many defects existed. The pupils were backward in mathematical knowledge and their English, while good, left something to be desired. Anatomy presented special difficulties. Dissection was impossible, and the subject had to be taught largely by resort to models, bones and illustrations, with occasional visits to the post-mortem room at Mulago hospital, a distance of about one mile from Makerere. The third and fourth year subjects presented further difficulties. I could not, single-handed, teach everything, and though I had access to Mulago Hospital for the purposes of clinical teaching, this did not suffice, and I had to ask for assistance in this respect. The hospital, however, was not sufficiently or adequately staffed to give all the assistance desired and pressure of routine work frequently resulted in the relegation of teaching to the background. It will be noted that Obstetrics and Gynaecology were not included in the curriculum. It was felt that the course was sufficiently full for an experimental start, and further that the time was not quite ripe for the introduction of these subjects. It was feared that the performance of pelvic examinations by young men on young women might discredit the hospital and hinder the cause of medical education.

It was soon apparent that the omission was serious, and that even if students were never actually to practise midwifery and gynaecology, these subjects must be an integral part of any system of medical education, as many of the aspects of medicine and surgery could not be appreciated properly without a basal knowledge of them. They were therefore introduced into the course for the second batch of students entering in 1925, and by the exercise of tact and supervision pelvic examinations caused no offence. It will also be observed that Pathology did not find a specific place in the curriculum. It was, however, taught, as far as possible, in the course of the lectures and demonstrations in medicine and surgery. The exclusion was due to the fact that no expert teacher was available, as the main Protectorate laboratory was twenty-six miles away. Since then this laboratory has been transferred to a site at Mulago and the subject is now taught by a member of its staff.

Further Development.

It will be realized that a system whereby an educational department was responsible for the whole of medical education was neither ideal nor practical, and opportunity arose in 1927 of making a change, when I became Medical Superintendent of Mulago Hospital and Principal of the Medical School to be established there.

It only remained to complete and elaborate the development referred to previously in order to fit the hospital for an ideal training ground. At the present time there is excellent accommodation for in-patients and a commodious well designed out-patient department with special departments has been built.

The infectious diseases hospital, formerly a separate unit in Kampala, has been transferred to Mulago, and as already recorded, the main Protectorate laboratory is now located there. Moreover it is the intention to build a new mental hospital for the protectorate and to place this also at Mulago.

The combined unit will therefore enable students to study every branch of medicine on the spot, and incidentally will lead to economy in management. One thing is lacking, X-ray and electrotherapy apparatus, but it is hoped that the omission will be corrected when funds permit.

The adequacy of the hospital for teaching purposes is shown by the following figures for 1932 :—

Beds 250 and 8 cots, isolation hospital not included.
In-patients 5,702.
Out-patients. New cases 21,856. Attendances 53,609.
Surgical operations 1,663.

The evolution of the hospital was accompanied by a similar evolution of its staff. It became possible to depart from general practice type of work towards specialism; and separate departments for Medicine, Surgery, Obstetrics and Gynaecology, Dermatology and Venereal Diseases, Ophthalmology, and Ear, nose and throat work, eventually came into being. Lectureships were established in Medicine, Surgery, Obstetrics and Gynaecology, Pathology, Bacteriology and Parasitology, Anatomy and Physiology, each lecturer being granted an allowance of £70 per annum. Smaller allowances of £50 per annum were granted to the Pharmacist teaching Pharmacy and to the Laboratory Assistant demonstrating Laboratory Methods and preparing specimens for the school museum. I attach great importance to these allowances as the posts are anything but sinecures. A great deal of preparation out of official hours is required when teaching students whose mentality and education are below European standard and often the construction of notes comparable to a text book is necessary. Moreover Medical Officers at a purely native unit have no opportunities for private practice such as district Medical Officers enjoy, and some reward for financial loss and extra work is essential.

A medical school of modest but sufficient size was built, providing three rooms, a dissecting room, a combined physiological and pathological laboratory, and a library and museum, each room being capable of use for other subjects than those for which they were specifically designed.

A hostel for residential purposes was built also. This is an absolute essential as the usual native dwelling gives no facilities for study. Moreover the advantages of living on the spot are very great, as students can be present at emergencies which generally occur out of official hours. Students are obliged to reside at the hostel, and in the same way as there is a Medical Officer on duty at night, so also students take turns of duty. It is in fact the custom for the student to be called first and make his examination before the Medical Officer arrives. Valuable experience is thus gained and a sense of responsibility inculcated.

Although medical education was separated from the Education Department, the separation was partial only, the teaching of the preliminary sciences continuing at Makerere College. It was, however, thought necessary to extend the one year devoted to these subjects to two, and in addition English and Mathematics were included, as a defective knowledge in these respects had been found detrimental to progress. The course was thereby extended to five years. The arrangement works admirably. Makerere College and Mulago Hospital are reasonably close, full contact is maintained between the two institutions, and a strong interest and liaison between the Education and Medical departments in matters concerning medical education is established.

It is also economical in that a common preliminary course serves for students at the college preparing for Medicine, Agriculture and Veterinary work. Students also have the advantages of the corporate life, discipline and participation in team games which can only be obtained at an educational institution of reasonable size. There is no mode of entry to a medical career except through Makerere College, and its entrance examination is the most difficult which a boy leaving school can take. It is hard to make an exact comparison with parallel examinations at home; the range of subjects is narrower, and the standard, while advancing yearly, is very much lower, but a good knowledge of English is an indispensable qualification. Medicine is a popular career, the number of students which can be accepted is limited, and a certain further degree of selectivity operates in that students are observed carefully during their first year and if judged unlikely to make good are advised to choose a less exacting vocation.

It is the fact that Medicine generally claims the best educated and most intelligent boys and indeed it is exceptional for a medical student not to be the holder of a scholarship.

Curriculum.

The present course is arranged as follows:—

At Makerere College.

First year Second year	Chemistry, Physics, Botany, Zoology, English, Mathematics.

At the Medical School.

Third year ...	Anatomy, Physiology, Pharmacy.
Fourth year	Medicine, Surgery, Pathology, Bacteriology and Parasitology, Pharmacology and Therapeutics.
Fifth year ...	Medicine, Surgery, Obstetrics and Gynaecology.

The academic year is divided into three terms, each of three months duration, with an interval of one month between terms. During the first three years these intervals are taken as holidays, but in the final two years students remain at the hospital during vacations except for an annual holiday of fourteen days. Lectures cease during the vacations, but students continue clinical work to extend their opportunities for gaining practical experience. Besides lectures there is of course much practical instruction and students are given appointments similar to the clerkships and dresserships in vogue in Great Britain, the appointments being changed every three months to give varied experience.

The position assigned to Obstetrics and Gynaecology in the fifth year seems to us more satisfactory than antecedent to Medicine and Surgery; we believe that the subject is picked up more readily after a grounding in Medicine and Surgery.

Lectures and Textbooks.

The reader no doubt will wish for some details of the lecturer's work. The lectures are absolutely systematic, guiding the student through the whole subject and attendance is obligatory. Frequently they consist of amplifications and explanations of the textbooks in use, while in some cases textbooks are dispensed with and the student furnished with typed notes covering the whole subject. We do not expect our people to read textbooks without guidance; we anticipate that they might pay equal attention to trivial detail and important principles. Clinical teaching is also part of a lecturer's duties.

While on the subject of textbooks it might be helpful to give some account of the place they take in the system. In the early stages of the scheme no use was made of books for the teaching of preliminary science. Notes were compiled and issued to pupils.

For the study of Anatomy and Physiology each student was given GROVES and BRICKDALE'S "Textbook for Nurses," a book dealing with the elementary principles of Anatomy and Physiology and also Medicine and Surgery. This was supplemented by BUNDY's "Textbook of Anatomy and Physiology." This book also is designed for nurses and is somewhat fuller than the first named. GROVES and BRICKDALE was used also for the teaching of Medicine and Surgery, typed notes being given amplifying the text. For Midwifery Comyns BERKELEY's "Handbook of Midwifery for Midwives, Maternity Nurses and Obstetric Dressers" was used. As time went on we decided that we had the capacity to teach and the students the power to assimilate in a more advanced fashion and the elementary nursing books gave place to such books as the following :—

Anatomy—BEESLY and JOHNSTON's "Manual of Surgical Anatomy."
Medicine—WHEELER's "Handbook of Medicine," and the "Memoranda on Medical Diseases in Tropical and Sub-Tropical Areas" of the Army Medical Service.
Surgery—CHIENE's "Handbook of Surgery."
Gynaecology—SOLOMON's "Handbook of Gynaecology."

No book on Physiology is now used, the lecturer's notes being tantamount to a textbook. In obstetrics also the lecturer prefers to give full notes based on TWEEDY's "Practical Obstetrics."

There is, of course, an adequate library of works larger than those mentioned. Students have access to this library, though it is intended to assist the lecturer more than the student.

Examinations and Subsequent Training.

Examinations are held at the following points in the course :—

Preliminary Sciences, at the end of the first and second years.
Anatomy, Physiology, at the end of the third year.
Pathology, Bacteriology and Parasitology, Pharmacy, Pharmacology and Therapeutics, at the end of the fourth year.
Medicine, Surgery, Obstetrics and Gynaecology, at the end of the fifth year.

On qualification, certificates are issued to successful candidates who receive Government appointments, with the title of Senior African Medical Assistant, at a commencing rate of pay of £7 *per mensem.* They become members of the native civil service and also are placed on the Uganda Medical Register in the same way as Sub-Assistant Surgeons, but are not permitted to set up in private practice on their own account. After qualification all Assistants remain at Mulago Hospital for six to twelve months and perform duties similar to those of house officers at home.

They receive special instruction in venereal diseases and departmental clerical duties. Owing to the extreme prevalence of venereal diseases very special attention is given to the subject, and every graduate is taught the details of the speciality in a far fuller manner than is possible in the time available in the pre-qualification period.

Standard Attained.

It is extremely difficult, in a short space, to give an exact idea of the standard attained. Full accounts of the Medical School are published in the annual reports of the Medical Department, and include the syllabus, examination questions, selected answers by candidates, examiner's comments and other details, and those who wish can obtain full information from this source. However, as no paper on this subject can be of much value without an indication of this standard I give extracts from the examiner's reports to provide some guidance in this respect.

As an examiner in the final examination we have been fortunate enough generally to secure the services of Dr. R. Y. STONES, M.D., F.R.C.S., M.R.C.P., of the Church Missionary Society's Hospital at Namirembe, near Kampala. I quote the following extracts from his reports :—

1928. " The examination has been a revelation to me both in the standard of English attained and in the extent of knowledge acquired. These students are educated men in the broad sense and are fitted to profit by experience in their profession."

1931. " Comparing this examination with that of 1928 a uniform improvement in the standard of medical education is found. A stiffer examination was set to test the knowledge of the students more thoroughly and it was proposed, if necessary, to accord marks more easily than in the previous examination. This was not found to be necessary as the students met the higher standard of questions asked successfully."

Dr. STONES also mentioned the names of two students whom he considered to have achieved honours standard.

1932. " This year to test the standard of attainment, for the first time many of the questions were selected from the easier ones set at the conjoint final examination of the Royal Colleges of Physicians and Surgeons."

" The questions, as will be seen from the examination papers, are not easy to answer without a good deal of independent thought and are not of the type which can be answered by mere book knowledge. As you know the African is an adept at quoting pages of a textbook from memory alone."

" The answers to these questions were on the whole good and showed a wide appreciation of the subject. Each of the candidates revealed the possession of a trained mind, shown by his ability to stick to the point and not to wander off the subject, thus little was missed, and what is more important to the examiner very little extraneous matter was added as packing."

So far as examinations can be accepted as a test, these remarks show that the standard of knowledge is reasonably high, but convey no information of practical ability. I personally have little fear on this account, as students enjoy greater opportunities for acquiring practical experience than do those in Great Britain. Both before and after qualification, in the field of surgery alone, they perform a great many operations such as circumcisions, curettage of ulcers, skin grafts, passing of bougies and catheters and give many anaesthetics. They also assist at major operations and even perform a few under supervision. In emergencies and when a Medical Officer is not available, they should be able to undertake such surgical work as amputations of limbs, operations for the relief of impassable stricture and extravasation of urine, the application of obstetric forceps and should make a good attempt to deal with cases of strangulated hernia.

It is not expected that all will be successes, any more than one finds that all Medical Officers and Sub-Assistant Surgeons are so. Much depends upon personality and character in our profession, qualities which cannot be imparted by training.

I think that it is generally agreed that we have succeeded in our aim to produce an Assistant capable of replacing the Sub-Assistant Surgeon, and in fact several have replaced them with satisfactory results. I quote an extract from a Medical Officer's report on an Assistant. " Intelligent and efficient, steady, sober, fond of games and sociable. He speaks and writes English well, his handwriting is clear and his books and notes on cases are kept neatly. He has been in charge of . . . hospital for over a year and has given the utmost satisfaction. He is sound professionally and rarely makes a mistake in diagnosis. He is competent at anaesthetics, microscopical work and venereal diseases. He is interested particularly in midwifery and operations and spends his free time in studying medical works."

There are good reasons for employing the native inhabitant apart from the point that he has a claim to employment in his own country if suitable. No European or Asiatic can get to the hearts and minds of the people as can one of their own kin, and the African Assistant, by close contact, precept and example, should exert a most favourable influence upon his own people in matters of health.

Future of Medical Education in Uganda.

A few words on the future of medical education in Uganda are necessary. There is little doubt that Makerere College is destined to be the centre of higher education for Eastern Africa, and I feel sure that the Uganda Medical School will take a similar position in regard to medical education. There are in fact, at the present time, at both institutions, students from other East African countries and I understand that it is likely that their numbers will increase. Is it probable that we shall raise our standard much in the immediate future ? As I have retired from the Uganda service I cannot speak with authority, but I surmise that consolidation and the development of post-graduate education are more probable than much advance. The present standard is sufficiently high for practical purposes and indeed I doubt whether it is possible to advance much further without extravagance in staff and equipment, for advance depends perhaps more upon the teacher than the pupil. There is one change which we hope to adopt when the standard of general education rises sufficiently and science is taught adequately in the schools. We expect then to reduce the two year preliminary science period to one year. This will enable Anatomy and Physiology to be advanced to the second year and extend the final period, devoted to the study of Medicine proper, to three years.

It may be expected of me to pronounce some opinion on the mental capacity of the African. I shall content myself by saying that he does seem capable of assimilating scientific ideas without much difficulty provided that pains are taken to simplify and explain, though with the present generation more concentrated and systematic effort by teachers is necessary than in Europe. The greatest attention must be given to stimulating the powers of observation and deduction. This is the most important point of all, for these powers are there but do require stimulation. The need for stimulus is to be expected when it is remembered that the students' immediate forbears concerned themselves with little beyond stock, crops, sexual matters and intertribal warfare.

I have referred to the desirability of simplification but the process must not be carried to the point of clinging always to rule of thumb methods and avoiding all difficult problems. It is most important to endeavour to produce a practitioner who can do much more than undertake mass treatments of prevailing diseases. It is essential to impress a native community with the great possibilities of European medicine, in order to gain its faith and confidence, for upon these depend co-operation in such matters as compliance with public health rules and regulations. I have noted that this connexion between curative and preventive medicine is not always appreciated. Some time spent over the elucidation of difficult or rare cases is therefore not ill-spent; the faculties are sharpened, the spirit of enquiry is cultivated, and the pursuit of Medicine is given a touch of idealism and culture.

I would counsel anyone embarking on a similar project to restrict production to reasonable limits. Due regard must be paid to the fact that later products should be more valuable than earlier ones, and a consideration of the numbers that a service can absorb is most essential. Our output for the Uganda service is between three to five per annum, and for financial reasons it is possible that the lower figure may obtain in future years. This figure applies to candidates for Government service only. As I have stated already, there is no other outlet at present but the advent of the native private practitioner may not be very remote.

Training of Lower Grades.

In concluding this paper, the bulk of which has been devoted to what might be termed higher medical education, I must make some reference to the training of the lower grades of the medical service, for Mulago Hospital is a training ground of nurses of both sexes. Many will always be nurses and nothing else, but a proportion of the males eventually take more responsible positions in charge of country dispensaries, and for this reason, besides a training in nursing methods, instruction is also given in the recognition and treatment of disease.

Until recently vernacular languages were used as a medium of instruction, but as there was no single vernacular understood by all the various tribes uniform teaching was a difficult matter. With the advance of education it has been found possible to obtain candidates with a fair working knowledge of English which has now replaced the vernacular.

The curriculum extends over a period of three years. During the first six months learners are posted to wards to become acquainted with routine nursing work, and are observed as to their suitability for training.

In the second six months they pass through the Junior course. The class is concentrated in the general medical and surgical wards and performs all the routine work under the direction of Sisters and senior native charge attendants. A Sister gives demonstrations in nursing methods, adhering to a syllabus. An African Assistant teaches the elementary principles of the structure and function of the body and something of the nature, causation and prevention of disease. At the end of the course an examination is held and the results, together with a consideration of conduct, character and industry, determine promotion to a higher grade with increased pay. Those who have been successful at this examination return to routine duty for six months and put into practice what they have been taught. During the second six months of the second year they pass through the senior course. Demonstrations and lectures in more advanced nursing methods are given by a Sister, first aid is taught by the European Dispenser, using the St. John Ambulance textbook and further instruction by an African Assistant is given in elementary Physiology and Anatomy and in simple and standard methods of recognizing and treating the common diseases of the country. At the conclusion of this course an examination is held, the results, as in the previous course, determining promotion and increased pay.

Systematic training is now ended but another year is spent at Mulago gaining practical experience, passing through the various departments, theatre and dispensary to this end. Some, at the request of District Medical Officers, may remain for another year's special training in theatre or dispensary work.

As a final word I must make it clear that I have spoken of Government schemes only. It is not within my province to do more than to record the fact that valuable work in medical training, especially of midwives, is carried out by Missionary Societies.

HELMINTHIASIS.

EGYPT, Ministry of the Interior. **Department of Public Health. Research Institute and Endemic Diseases Hospital. First Annual Report 1931.**—15 pp. 1933. Cairo: Govt. Press. [P.T. 10.]

A building has been erected and equipped into which the research section for ankylostomiasis and bilharziasis in Egypt moved in February, 1931, and it is hoped that it will prove a nucleus for a future Research Institute and an Endemic Diseases Hospital.

Apart from matter already noticed in this *Bulletin*, its work during 1931 comprised an attempt to exterminate snails in a localized area of 500 acres, which, after a parasitic survey, was abandoned, partly because neither the population nor the water supply was in fact isolated. The rowing pond in the Kobba Royal Palace has been freed from snails and stocked with gambusia. Leucocyte counts have been made in 35 cases of *S. haematobium* infection and in them no changes were detected after treatment. Experiments are being carried out on the life histories of molluscs. The Consultative Committee has decided that chemical tests suffice for determining the purity of carbon tetrachloride. Carbon tetrachloride in unstated dose cured in one treatment 24·78 per cent. of cases, as determined by an unstated diagnostic technique. The numbers of examinations and treatments for helminthic disease are given. *Clayton Lane.*

BLOCH (A.) & BIRCHER (Max Edwin). Eine Wurm-Enquete. [**A Helminth Survey.**]—*Schweiz. Med. Woch.* 1933. June 17. No. 24. pp. 594–597. With 2 figs.

Faecal examination, presumably by smear, of 277 children in 25 Children's Homes in Switzerland showed 22 per cent. worm-positive; 9 homes being free from infection.

Numbers found infected were: with trichuris 38, ascaris 29, enterobius 4. Infection increased with age, and comprised 46·7 per cent. of those between 10 and 14 years old. On stools sent in by 160 medical men, 1,031 examinations were made, with the following positive results: ascaris 135, trichuris 240, enterobius 12, taenia 2, total 389. Those from an intern practice numbered 1,209 with 497 positives; and in detail percentage: ascaris 14, trichuris 24, enterobius 1, taenia 0·2. *C. L.*

HIYEDA (Kentaro) & SUZUKI (Michisaburo). **Parasites of Manchurians.**—*Jl. Oriental. Med.* 1933. May. Vol. 18. No. 5. [In Japanese. English summary pp. 50–51.]

A detailed piece of work on faecal examination of 760 apparently healthy Manchurians, one to 6 examinations, presumably by smear, being made on each. The results appear to be essentially of local interest, but the maximum percentages of ascaris, hookworm and trichuris found were 85, 61·6 and 80·7. *C. L.*

SINTON (J. A.). **Helminthic Infections in Indian Anopheline Mosquitoes.**—*Records of the Malaria Survey of India.* 1932. Dec. Vol. 3. No. 2. pp. 347–351. [24 refs.]

A useful summary of the literature with the following new observations: *A. culicifacies* showed 3 larval nematodes entangled in the malpighian tubes identified by KORKE as Agamomermis. Four anopheline larvae (*A. gigas* and *A. lindesaii*) from near Kasauli showed coiled nematode larvae 14 mm. long seeming to fill the entire body. *A. culicifacies* showed about 60 encysted trematode larvae, apparently identical with those already described by SINTON (*Indian Jl. Med. Res.* 1917. Vol. 5. p. 192). *C. L.*

JOURNAL OF PARASITOLOGY. 1933. Mar. Vol. 19. No. 3. pp. 242–256.—**Proceedings of the Helminthological Society of Washington. One Hundred and Forty-Ninth Meeting.**

John T. LUCKER reported that repeated intraperitoneal injection of *Trichinella spiralis* extract in 1 per cent. Coca's solution failed to immunize 2 white rats.

M. C. HALL urged that since scientific papers are international and read by many not too well up in the language in which they are written, 5 points should be observed: (1) Figures should be in numerals not letters. (2) In morphological descriptions superfluous words (*is, there is, is situated,* etc.) should be omitted. (3) Key words should be placed first in the sentence. (4) Compounded words with *like* or *shaped* should be hyphenated. (5) Colloquial terms should be avoided since they are in other countries as useful as the slang term " as long as a piece of string." *C. L.*

TAKASAKI (Juichi). **Eggs of Intestinal Parasites found in the Dirt under Finger Nails.**—*Jl. Public Health Assoc. Japan.* 1933. May. Vol. 9. No. 5. pp. 1–6.

In the Saitama prefecture 513 children were examined, and 3·7 per cent. had worm eggs under their nails, namely ascaris 2·92, enterobius 0·78 and trichuris 0·19. Compared with the intestinal infections the nail infections were for ascaris 15 to 347, and for trichuris 1 to 101. Presumably the faecal examination was by smear; enterobius eggs were so found twice only. *C. L.*

NÁJERA (L.). Una nuova tecnica per la numerazione di uova di elminti nelle feci. [**A New Technique for Enumeration of Helminth Ova in Faeces.**]—Reprinted from *Diagnostica e Tecnica di Laboratorio.* 1932. May 25. Vol. 3. No. 5. 9 pp. With 3 figs.

In effect this is a modification of Stoll's counting method by substituting a glass stoppered bottle for his rubber corked flask and a decinormal solution of carbonate of soda for caustic soda. A ruled counting cell is substituted for an ordinary slide and to the whole is attributed, quite pontifically, an extraordinary practical value. Similarly the allowances necessary for 5 kinds of stool consistence are definitely laid down, and for the proportions of male to female ancylostomes, necators and trichuris. No evidence is offered that this technique improves on Stoll's technique in any way. *C. L.*

VAN SLYPE (W.). Contribution à l'étude des helminthiases intestinales. [**Study of Intestinal Helminthiases.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 569–579.

In effect this paper investigates whether the pyramidon reaction in the serum due to absorption of shed blood, one common in a ruptured ectopic gestation, is upset by parasites which draw blood.

The pyramidon reaction is carried out thus. In each of 3 tubes place 8 drops of 50 per cent. acetic acid and 8 drops of peroxide of hydrogen. To tube 1 add 1 cc. of a 5 per cent. solution of pyramidon in alcohol and 2 cc. of 94 per cent. alcohol; to tube 2 add respectively 2 and 1 cc. and to tube 3 add 3 cc. of the pyramidon solution. Mix. Draw off blood from a vein, incubate for 1 hour at 37°C. to hasten separation of serum, centrifuge this twice, and let a drop fall into each tube. It leaves a white track which in a positive reaction turns violet and then fades. The results in 63 cases were as tabulated.

Parasite	No. of cases	+ Reactions: percentage		
		strong	weak	total
Ankylostome	41	31·8	29·2	61·0
Schistosome	11	36·4	27·3	63·7
Strongyloides	9	22·2	0	22·2
Trichuris	3	66·6	0	66·6
Enterobius	2	0	0	0
Trichomonas	4	0	0	0

In multiple infections the elimination of hookworms may or may not make a positive reaction negative. The degree of reaction was not parallel with the number of eggs as obtained by a Stoll count.

C. L.

VAN SLYPE (W.). Contribution à l'étude des helminthiases intestinales (deuxième note). [**Study of Intestinal Helminthiases.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. 13. No. 1. pp. 85–86.

Transferred to the Kasai district, van Slype has continued his pyramidon serum investigation, this time in 26 ascaris-infected persons. There were strong reactions in 8, feeble in 8 and none in 10; or 61·5 per cent. of positives. Of 3 pure trichuris infections, two gave positive reactions and one negative, but since all had originally had multiple infections and the state of single infection was reached only after treatment the author does not press this point. *C. L.*

ALEXEIEFF (Georges). Sur l'hématopoièse dans les helminthiases. Sur la question de l'origine des éosinophiles. [**Haemopoiesis in Helminth Infections. Origin of Eosinophils.**]—*Folia Haematólogica.* 1933. Mar. Vol. 49. No. 3/4. pp. 444–446.

Sternal marrow was obtained on one occasion for each of 12 persons while each had several blood examinations. The number of myelocytes and megalokaryocytes in 500–1,000 cells was noted as also was the number of pro-erythrocytes and normoblasts to 100 white corpuscles. Infections were: with *T. saginata* 7 (2 having also *E. vermicularis*), *F. hepatica* 3, hookworm 1, hepatic hydatid 1. Usually there was parallelism between the production of eosinophils in the marrow and their numbers in the blood. Of 4 without helminths one had amoebiasis with "local" eosinophilia, in the blood 9 per cent. and in the marrow 14. In 4 leishmania cases there was a parallelism between loss of eosinophils from the marrow and from the blood. *C. L.*

PONS (R.). Les probabilités et le terrain vermineux. **[Helminth Infection: Predisposition and Exposure.]**—*Rev. Méd. et Hyg. Trop.* 1933. Mar.–Apr. Vol. 25. No. 2. pp. 95–99.

Pons sets himself to explain how, from simple mathematical data, it may be simply determined whether the actual helminthic distribution in a community of persons with reasonably uniform habits is due to individual predispositions or to exposure to infection. He concludes from analysis of figures from 1,250 examinations at Tonking and 850 at Saigon that in intestinal helminthic infections the question of predisposition need not come under consideration. *C. L.*

TERASAKO (S.). Ueber die Reizwirkung des Tetrachlorkohlenstoffs auf die Leberfunktion. **[Stimulus of Carbon Tetrachloride on Liver Function.]**—*Arb. a. d. Med. Fakultät Okayama.* 1933. Mar. Vol. 3. No. 3. pp. 370–385. With 3 figs. [50 refs.]

The apparently unconscious assumption here is that the action of carbon tetrachloride on the liver will be the same whether it is given in small or large doses and whether by mouth or injected intramuscularly. The latter procedure was adopted on dogs in this work and it is concluded that in doses of 0·001 to 0·0007 cc. per kilo [corresponding in a man of 70 kilos to a total dose of 0·07 to 0·049 cc.] carbon tetrachloride is not the hepatic poison which it has hitherto been held to be, but must be looked on as a means of bettering liver function, which was in fact measured by collection of bile through a biliary fistula. *C. L.*

CUTLER (Jessie T.). **The Influence of Diet on Carbon Tetrachloride Intoxication in Dogs.**—*Jl. Pharm. & Experim. Therap.* 1932. June. Vol. 45. No. 2. pp. 209–226. With 2 figs. [24 refs.]

" The effects of the following diets upon the degree of liver destruction and intoxication produced in dogs by carbon tetrachloride have been studied: (*a*) lean meat without bones, a diet very low both in calcium and carbohydrate; (*b*) lean meat and calcium salts; (*c*) bread and milk, a diet rich both in calcium and carbohydrate; (*d*) lean meat and dextrin, low in calcium but rich in carbohydrate, and (*e*) beef fat and cream, a diet very high in fat.

Diet given	Number of dogs	Percentage dying	Percentage without symptoms	Percentage of liver substance necrosed
Lean meat without bones	131	75	14	25 to 95
Lean meat and calcium salts	98	18	75	35 to 95
Bread and milk ...	14	14	79	30 to 90
Lean meat and dextrin ...	18	39	39	10 to 90
Beef fat and cream ...	8	26	62	40 to 70

"We have not been able to demonstrate any consistent differences in the amount of liver damage produced by carbon tetrachloride in the dogs on different diets. In every group, the amount of destruction, judged by an estimation of the per cent. of liver tissue necrosed, varied from moderate to extremely severe, with averages which were not significantly different.

"On the other hand, the severity of the symptoms and the number of deaths secondary to the liver damage can be profoundly affected by the diet."

"The significant chemical changes in the blood of poisoned animals are an increase in guanidine and a severe and often fatal hypoglycemia. It is believed that the symptoms of intoxication and the hypoglycemia are secondary to the increase in guanidine. The antagonism between guanidine and calcium has been repeatedly demonstrated.

"Our experiments indicate that none of the above diets will protect the liver tissue from destruction by carbon tetrachloride. In order to be protective against the intoxication resulting from the drug, a diet should (*a*) not tend to increase guanidine as meat has been shown to do; (*b*) be rich in calcium to combat guanidine, and (*c*) be rich in carbohydrate to relieve hypoglycemia if it develops. Diets which fulfill these requirements have given us a high resistance to carbon tetrachloride with the least symptoms of intoxication and the lowest death rates."

[For previous work on this subject see this *Bulletin*, Vol. 25. pp. 417, 469; Vol. 27. p. 569.] *C. L.*

BERGMANN (O.). Oleum Chenopodii als Ursache einer Gehörstörung. **[Oleum Chenopodii as Cause of Deafness.]**—*Muench. Med. Woch.* 1933. May 12. Vol. 80. No. 19. pp. 734–735.

This well-known effect of chenopodium is reported as if a new observation.

A man had a herring for breakfast, 4 hours later 20 drops of novocaine (apparently 0·4 gm. in 10 cc.) to lessen vomiting, half an hour later 9 cc. of oil of chenopodium in black coffee [or over three times the minimum lethal dose], two hours later a dose of salts, twice repeated; he vomited all three. He became completely deaf for two days and his hearing has not yet fully returned, tests showing that there is damage to the auditory nerve. The moral drawn is that the greatest care is advisable in the administration of chenopodium oil. *C. L.*

MILNE (J. Coutts). **A Case of Beta-Naphthol Poisoning.**—*Malayan Med. Jl.* 1933. Mar. Vol. 8. No. 1. pp. 73–74.

By the courtesy of Dr. Coutts Milne some details can be added to the printed account: In the quarantine camp, Port Swettenham, treatment is given to all healthy persons without individual diagnosis. A male Tamil in the camp, aged 35 years, was given in the morning beta-naphthol in two doses of 10 grains (0·6 gm.) at an interval of half an hour, followed by a saline purge. He had 4 or 5 loose motions, took his meal at 5 p.m. well, was admitted to hospital at 8 in collapse and died in 20 minutes.

At autopsy the whole of the mucous membrane of the stomach and first 2 parts of the duodenum was studded with haemorrhagic spots, and the head of the pancreas was similarly affected; from the hepatic flexure downwards the mucous membrane of the large intestine was markedly congested as were the kidneys; the urine contained no albumen and no blood cells. [The minimum lethal dose of beta-naphthol is, then, lowered to 20 grains (1·3 gm.).] *C. L.*

WRIGHT (Willard H.), BOZICEVICH (John), UNDERWOOD (Paul C.) & SCHAFFER (Jacob M.). **N-Butylidene Chloride, a New Anthelmintic.**—*Vet. Med.* 1933. Feb. Vol. 28. No. 2. pp. 52–64. [15 refs.]

Experiments were carried out on chickens, cattle, horses, cats and dogs. Only the two last need be considered here.

In 21 dogs which received the drug at the rate of 0·3 cc. per kilo, the efficiency against ascarids was 96·5, hookworms 100, whipworms 7·8. Most showed no pathological lesions attributable to the drug. When they occurred they were as follows—Histologically there was in the liver moderate cloudy swelling, in some more than moderate; in one very marked fatty degeneration, in five slight to moderate; in one marked central necrosis but this animal had distemper with high temperature. In the kidneys of 3 slight cloudy swelling and congestion.

In 28 cats 1 showed slight gastritis and two very slight enteritis. The liver lesions were more severe than in dogs and in many of them there was acute toxic necrosis, lesions being most marked in young animals.

In man 5 cc. produced epigastric warmth with eructation and in one or two hours levitation without dizziness, and looseness of the bowels even in doses of 1 cc. [The doses noted above are at the rate of 21 cc. for a man of 70 kilos.] *C. L.*

BARLOW (C. H.). **The Effect of the "Winter Rotation" of Water upon Snails involved in the Spread of Schistosomiasis in Egypt, 1930–1931 and 1931–1932.**—*Amer. Jl. Hyg.* 1933. May. Vol. 17. No. 3. pp. 724–742. With 7 figs. & 2 charts.

The non-operculated snails *Planorbis boissyi* and *Bullinus truncatus* (= *B. contortus*) survive the drying produced by the winter closure of irrigation canals in Egypt.

The work was done during the closures of 1930–1 and 1931–2. Its origin is significant. While crossing the Fayoum desert Barlow found the non-operculated snails *Eremena desertorum* stuck to stones too hot to handle comfortably; yet when crushed they were wet, juicy and alive in a perfectly dry desert. That being so, might not *P. boissyi* and *B. truncatus* survive moderate drying? From a canal bed which had been empty for 30 days with a dry and deeply cracked bottom 82·4 per cent. of the former and 50 per cent. of the latter snails were found to be alive, though none were infected. They survive by the production of an epiphragm of silvery slime; planorbis thereafter merely shrinks far into the shell as it dries; bullinus however first arranges itself so that the aperture of its shell is pressed down into the mud. It makes in Egypt little attempt to dig itself in whereas in the Sudan at Abu Zabed it buries itself completely in quite a short time. Eggs readily die on drying. *C. L.*

ARCHIBALD (R. G.) & MARSHALL (A.). **Note on a Schistosoma Cercaria with Four Pairs of Flame Cells in the Body.**—*Parasitology.* 1933. Jan. Vol. 24. No. 4. pp. 542–544. With 1 fig.

In spite of their having 4 instead of 3 pairs of flame cells in the body as well as one pair in the tail, the view is expressed that these cercariae probably constitute an aberrant form of *S. haematobium.*

Bullinus truncatus which were shedding pigmented cercariae were exposed to miracidia from terminal spined eggs shed by a typical case of Soudanese vesical schistosomiasis. After 83 days they began to shed furcocercous cercariae almost completely covered with retrorse spines, having 3 pairs of penetration glands, 4 flame cells, and 2 of ciliated areas. *Cercopithecus sabaeus* exposed to skin and mouth infection, began 4 months later to pass blood and mucus per anum with terminal-spined ova, and when killed showed adult male and female *S. haematobium* in the mesenteric veins and terminal-spined ova in the mucosa of the colon. *C. L.*

CAWSTON (F. G.). **A Considered Opinion as to the Best Treatment of Bilharzia Disease.**—*East African Med. Jl.* 1933. June. Vol. 10. No. 3. pp. 90–92.

The size of superficial veins is rarely so small as to force the use of intramuscular emetine in preference to intravenous potassium tartar emetic, and this is fortunate since, though both are equally effective against schistosomes, the risk of severe damage to the heart and nerves is too great to justify that continuance of emetine injections through the fourth week which is essential for cure. Colloidal preparations of antimony are uncertain vermicides. "Fouadin . . . . often produces late vomiting and insiduous symptoms of hepatic disturbance which renders the treatment of a comparatively harmless disease an unnecessarily serious one." The advised treatment is careful regulation and administration of potassium antimonium tartrate for not longer than a month, and this will cause no vomiting or other inconvenience to out-patients. *C. L.*

HASSAN (Ali). **A Note on the Treatment of Bilharziosis with Bismuth.**—*Jl. Egyptian Med. Assoc.* 1933. Jan. Vol. 16. No. 1. p. 96.

Neotrepol produced no change in the ova passed in the urine of a patient. The drug contains 0·08 gm. of precipitated bismuth in each cc. The course consisted of 18 injections at 3 days interval; four injections of 1 cc., four of 1·5 and ten of 2, or 30 cc. in all, containing 2·4 gm. of bismuth. *C. L*

PERRET-GENTIL (A.). Notes sur les cas de bilharziose intestinale traités à l'hôpital de la Mission Suisse de Chicumbane (Afrique orientale portugaise). [**Cases of Intestinal Schistosomiasis treated in Portuguese E. Africa.**]—Reprinted from *Rev. Méd. Suisse Romande.* 1933. Mar. 25. Vol. 53. No. 4. pp. 193–206. With 2 charts.

Through this hospital there pass yearly about 1,800 cases and among them there have been in all during the last 5 years 429 cases of vesical and 120 of intestinal bilharziasis; though in another mission dispensary 10 of 15 stools examined showed ova of *S. mansoni*. Infection with both schistosomes is not uncommon, but while ova of *S. haematobium* have twice been found locally in stools, those of *S. mansoni* have not been found in the urine. The value of fouadin by reason of its slight toxicity and its intramuscular use is pointed out, but it has nevertheless produced nausea, vomiting and collapse in certain local cases. *C. L.*

HASSAN (Ali). **The Susceptibility of Bilharzia Miracidia to Different Salts and Different pH.**—*Jl. Egyptian Med. Assoc.* 1933. Mar. Vol. 19. No. 3. pp. 229–231.

The miracidia of *S. haematobium* and of *S. mansoni* were affected in like manner. They were killed in 4 hours by the following percentages of chlorides: sodium 0·9, potassium, magnesium or ammonium 0·7, calcium 0·5. An acidity of pH 5 killed them in 30 minutes, whereas with pH 11 they survived for this same period.

C. L.

GIRGES (Rameses). **The Clinical Aspect of Schistosomiasis Mansoni.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1932. Dec. Vol. 8. No. 2. pp. 99–148. With 5 graphs, 12 charts & 3 plates. [Spanish version pp. 149–192.]

A detailed study of the subject which should be consulted in the original. *C. L.*

LEE (C. U.). **Treatment of Schistosomiasis Japonica with Fouadin in Experimentally Infected Rabbits.**—*Chinese Med. Jl.* 1932. Dec. Vol. 46. No. 12. pp. 1169–1178. With 1 chart.

Thirty-six rabbits were subjected to infection, and later died or were killed. Three were then without evidence of infection; five contained males only; seven died before treatment was finished, all of them harbouring worms; six controls had no treatment, all became infected as shown by finding of worms, but one probably underwent spontaneous cure since none were found although conditions were favourable; fifteen were treated with fouadin, seven intramuscularly and eight intravenously. The dosage as compared with that advocated by KHALIL, namely 40 cc. for a man of 60 kilos, was much greater being 6 cc. for rabbits varying from 0·9 to 2·2 kilos. Of the seven cases treated intramuscularly five were cured or probably cured; in one 132 males and in the other 28 males and 10 females were found alive. Of the eight cases treated intravenously two were cured or probably cured, two were not cured, four relapsed, but one of the relapses later underwent spontaneous cure. Intramuscular injection was then more efficient than intravenous, but fouadin "falls short of an ideal specific." *C. L.*

HOEPPLI (R.). **Histological Observations in Experimental Schistosomiasis Japonica.**—*Chinese Med. Jl.* 1932. Dec. Vol. 46. No. 12. pp. 1179–1186. With 7 figs. (1 coloured) on 4 plates.

The tissue changes described fall into two parts, those round eggs and those in small hepatic vessels.

Round the eggs.—The line of reasoning is this: The free swimming miracidia may have attached a small droplet evidently coming from the lateral glands. Within the shell as the egg lies in the tissues there may be seen a similar droplet staining but slightly with eosin as do the lateral glands themselves; similarly staining matter may be so great in quantity as to push the miracidium aside and presumably it comes from the same source. In the tissues round the egg there may be found radiating flame-like threads staining vividly with eosin [the coloured plate is most striking]. It is concluded that almost undoubtedly this substance must be a secretion, that it must come from the lateral glands and not from the strongly eosinophil cephalic glands, since Hoeppli has never observed strongly eosinophil secretion within the shell, and that it must change its affinity to eosin when it passes outside the shell. Nevertheless the tissue has a decisive influence since this radiating staining has in Hoeppli's hands appeared only in rabbits (though it is noted that FUJINAMI *et al.* (1916) reported it in man and animals) mainly in the lung, more rarely in the liver and only in a few instances in the intestine. Round this palisade lie degenerating polymorphs or a zone of frank necrosis with a belt of epithelioid cells and outside that round cells, plasma cells and large mononuclears. Fibrous tissue forms far less in animals treated soon after infection (fouadin was used) than in untreated, and its formation in excess is another feature of rabbit infection.

Regarding changes round the hepatic blood vessels particular remark is made of ramifying connective tissue strands round sublobular veins.

C. L.

ELSBACH (L) Eosinophiele Appendicitis **[Eosinophilic Appendicitis.]** —*Nederl Tijdschr. v Geneesk* 1933 Mar 18 Vol 77 No 11. pp 1204–1209 With 1 plate. English summary (6 lines).

" 1 Of 68 appendices removed in Suriname, 4 showed peculiar eosinophilic infiltrations of the submucosa, muscular and subserous layers In 2 cases also eggs of schistosoma mansoni were present 2 The etiology of the morbid changes must be an infection with the schistosoma mansoni, *i e.*, a hematogenous infection 3 Clinically the eosinophilic appendicitis assumes the pictures of the acute or the chronical appendicitis. The complaints disappear after appendectomie." *C. L*

MAJANZ (A I) Der erste Fall von Bilharziosis in U S S R **[First case of Bilharziasis in U.S.S.R.]**—*Ztschr f Urol* 1932 Vol 26 No 10 pp 665–673 With 6 figs

A man of 26 who came to Moscow from Africa The interval is not mentioned *A G B*

BRADLEY (Burton). **Some Observations on Australian Human Trematode Endemiology based on Local Sheep Fluke Investigations.**—*Med. Jl. Australia.* 1933. Feb. 25. 20th Year. Vol. 1. No. 8. pp 245–251.

" 1. My field and laboratory work in investigating sheep fluke has, *inter alia,* disclosed circumstances suggesting the urgent need of a thorough investigation of the possibilities of importation and spread of certain trematode human infestations in this country.

" 2. They suggest, also, that team work is desirable as the facts concerning such disease spread involve a wide range of knowledge, especially of biology, geology, chemistry and local socio-economic conditions.

" 3. It seems desirable that careful attention be given by health authorities to the possibilities of preventing the danger of importation of carriers of the adult flukes concerned and their respective intermediate hosts.

" 4. In the case of arrivals by air it is suggested that particular danger lies in the rapid movements of infected persons thereby provided. Here it would seem that microscopic tests should be made on arrival or shortly after.

"5. In steamer transport modifications might be made which, while still insisting on microscopic evidence of freedom from infection, might bring this about by the acceptance of proper certificates from recognized laboratories in the country of embarkation." *C. L.*

CHATRON (M.). Un nouveau cas de distomatose humaine à *Fasciola hepatica.* [**Fresh Case of Human Infection with** ***F. hepatica.***]—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 24–25.

A man was sent to Plombières with a diagnosis of hepatic congestion and chronic appendicitis radiologically confirmed. He had fever and had lost 9 kgm. Examination of faeces after concentration (the method is unstated) showed a few eggs of *F. hepatica* which continued in spite of abstinence from flesh. *C. L.*

HUNG (See-lü). Ueber die Morphologie von *Fasciolopsis buski* beim Menschen in Hsiao-Shan. [**Morphology of** ***F. buski*** **in Man in Hsiao-Shan, China.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. June. Vol. 37. No. 6. pp. 315–317. With 1 fig.

It is concluded that the specimens in question are young *F. buskii*, barely mature. *C. L.*

ERHARDT (Albert). Testierungsmethode dreiwertiger Antimonpräparate an der Opisthorchiasis der Katze. [**Method of Testing of Trivalent Antimonials on Opisthorchiasis in Cats.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Mar. Vol. 37. No. 3. pp. 131–135.
—— & BRUMPT (L.). Wirkung der Brenzkatechindisulfosäure und ihrer Komplexverbindungen auf *Opisthorchis felineus* (Riv.) in vitro und in vivo.—*Ibid.* Apr. No. 4. pp. 182–190. With 2 charts.

The preparations used were antimony tartrate and fouadin, and the methods of appraisement a new egg-counting method and post-mortem examination.

The method of egg counting is described as that of Szidat modified in detail and used on a stool enriched by Telemann's method, mixed with 2 per cent. tragacanth solution in proportion of 2 to 5, using 0·0375 cc. of the suspension and counting the eggs in a Zschucke counting chamber. As for its value it is in fact used to check itself. The dose of antimony tartrate was 1·7 mgm. per kilo and of fouadin 3·4 mgm. per kilo given subcutaneously. Eight days later no opisthorchis were present in liver or pancreas. *C. L.*

TARASSOFF (W.). [**On the Differential Diagnosis of True and Pseudo-Dicrocoeliasis.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1932. Vol. 1. No. 1. pp. 50–52. [In Russian.]

About 200 cases of human infection with *Dicrocoelium lanceatum* were recorded in Russia between 1925 and 1929, and there is now a tendency to regard this infection as being fairly common. The author draws attention to the difficulty of distinguishing between true infections and cases when trematode ova taken with cooked food have passed through the intestine, since killed eggs cannot easily be differentiated from living ones. Repeated faecal examinations of patients on a diet from which liver is excluded, and the examination of duodenal juice are recommended as the only reliable methods for the diagnosis of dicrocoeliasis. *C. A. Hoare.*

VOGEL (Hans). *Himasthla muehlensi* n. sp., ein neuer menschlicher Trematode der Familie Echinostomidae. [*H. mühlensi*, **a New Human Trematode.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Feb. 23. Vol. 127. No. 7/8. pp. 385–391. With 4 figs.

A German on furlough from Columbia allowed himself to be examined at the Hamburg Tropical Institute and was given [perhaps as a routine measure] oil of chenopodium. He passed 5 flukes 11 to 17·7 long* belonging to the genus *Himasthla* which has hitherto been found in birds only.

The collar contained 32 hooks, including 2 corner hooks on each side. Testes oval in the axis of the worm, 0·645 to 0·95 by 0·26 to 0·39, cirrus in a cirrus sac and armed with rose-thorn prickles. Yolk glands reach from the tail end to the posterior end of the cirrus sac. Eggs measure 0·13 (0·114 to 0·149) by 0·075 (0·062 to 0·085). The new species is based on the armature of the cirrus and the size of the eggs. The history suggests that he obtained infection by eating raw shellfish. *C. L.*

BIRKELAND (Ivar W.). **"Bothriocephalus Anemia."** *Diphyllobothrium latum* **and Pernicious Anemia.**—*Medicine.* 1932. Feb. Vol. 11. No. 1. pp. 1–139. With 9 figs. [485 refs.]

A monograph reviewing the literature, with these conclusions :—

Most hosts of *D. latum* suffer no harm. Without anaemia there may be neuroses and fits ; or irregular bowels, glossitis and stomatitis ; or any transition from a normal blood to one with 4,000,000 erythrocytes to the cmm., this being taken arbitrarily as the dividing line between non-anaemia and anaemia. As for the anaemia, with few exceptions it is indistinguishable clinically, haematologically and pathologically from cryptogenetic pernicious anaemia, but while the latter has rapidly increased in Helsingfors hospitals since 1910, the former has steadily lessened since 1898 perhaps because of early treatment by family doctors. The early decades of life are most commonly affected. Achlorhydria is present in 84 per cent. of cases, and especially occurs after 20 years of age. Numbness and tingling are not uncommon, but the incidence of subacute combined sclerosis has not been fully investigated. Disinfestation has since 1885 reduced the mortality rate from 100 to 12, fatalities being greatest after 60.

Of the 750,000 persons in Finland estimated to be infected, anaemia develops in only 1 or 2 per 10,000 ; some of these die after disinfestation, some once cured may become reinfected without anaemia. More than 70 per cent. of 550 reported cases of *D. latum* anaemia have occurred in Finlanders, who belong to the Finno-Ugric race ; the inhabitants of Sweden, Italy, Rumania and Japan are heavily infected but surprisingly free of anaemia. Diphyllobothrium anaemia has been reported 15 times in 2 or more members of the same family ; and occurrence of this anaemia in one member and of cryptogenetic pernicious anaemia in another member has been reported in four families. Moreover recurrent anaemia has followed reinfestation in 4 or 5 cases (all cured), and in 17 cases cure of tapeworm anaemia has been followed by death from cryptogenetic pernicious anaemia in the absence of reinfestation, so that the role of the worm must merely be a precipitating one—a trigger mechanism. As possible explanations, the worm may alter the intestinal flora, it may harm the intestinal wall, may act as an irritant, or its toxins through the circulation may alter metabolism. The host may fail to "detoxify," the success of treatment with liver and gastric wall may indicate these organs as the site of detoxification, and there is some evidence that pernicious anaemia is in the order of a " chronic foreign-protein reaction." The impression is that, in some, the tapeworm is the last straw and when this is taken off the prognosis is good, so that those surviving this anaemia may be classed as suffering from an abortive form of genuine pernicious anaemia. *C. L.*

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*All measurements in mm.

PETRUSCHEWSKY (G. K.) & TARASSOW (Wictor). Die Bekämpfung des *Diphyllobothrium latum* in Karelien. [**Measures against *D. latum* Infestation in Karelia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. June. Vol. 37. No. 6. pp. 307–315. With 1 map.

The authors collect together the records of 62 investigations on man and fish in Russia.

Of these records 30 show infection with *D. latum*; a map shows that the heaviest percentages of infection lie in the north-west of the U.S.S.R., running as high as 76 per cent. Where population is thickest, where fishing is a chief industry, and where feeding habits are none of the best, there is parallelism between infection of man and fish. Thus at Kronstadt the reported infection of *Perca fluviatilis* and *Acerina cernua* with plerocercoids was 51 and 82 per cent. respectively, and of *Esox lucius* 100 per cent. *C. L.*

MAHADEVAN (V.) & MENON (T. Bhaskara). **Hydatid Disease in South India.**—*Indian Med. Gaz.* 1933. Apr. Vol. 68. No. 4. pp. 206–208. With 1 fig.

Seven cases of hydatid cyst in Indians are reported, one of the breast, the others of the abdomen, one of the latter group being multilocular and apparently with an exogenous mode of development.

The rarity of this infection in India is held to be partly real, partly apparent. The first is due to the fact that the Indian dog is, possibly with the rarest exception, a pariah; he has no place in the home. [I have found hundreds of scolices in a single dog in Berhampore, Bengal.] The second is that such cases being unexpected are overlooked, indeed the forms of the provincial annual reports contain no heading for them. *C. L.*

MAC ARTHUR (W. P.). **Cysticercosis as a Cause of Epilepsy in Man.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 525–528. With 1 plate.

Of the last 22 cases of epilepsy admitted to Millbank Hospital 10 had cysticerci of *Taenia solium* (*C. cellulosae*), and Mac Arthur has himself met with over 20 proved cases of cysticercosis. The invariable history is that epilepsy appears during adult life or after service abroad. Another curious feature is that there is in most of them no history of a previous tapeworm, so that unless it is frequently possible to harbour and lose a tapeworm without knowing it, these men were not self-infected.

As shown by autopsy cysts may be entirely restricted to the brain, [illegible] cysts in the tissues. When the cyst walls have become calcified they throw small elongated, indeed spear head, shadows to X-rays. Hamilton FAIRLEY showed complement fixation in 5 cases, none in 3 and a doubtful reaction in one. Surgical treatment in cerebral cases should be undertaken with hesitation since autopsy in all 3 cases examined showed large numbers and wide distribution of cerebral cysts. Intravenous injection of antimony tartrate is being tried in treatment. *C. L.*

TERAI (T.). Sur un cas de Cysticercus cellulosae hominis. [**Human Infestation with** *Cysticercus cellulosae.*]—*Jl. Oriental Med.* 1933. May. Vol. 18. No. 5. [In Japanese. French summary p. 52.]

This condition is rarely met with in Japan and this case was remarkable in presenting a large number of cysts, 195 were counted and practically every part of the body seemed to be involved except the palms and soles. Blood examination revealed an eosinophilia of 30·5 per cent. *H. H. S.*

APPHATIE (I. Lucio Ymaz). Le traitement biologique de l'hydatidose humaine. (Communication préliminaire). [**Biological Treatment of Hydatid in Man.**]—*Rev. Sud-Américaine de Méd. et de Chirurg.* 1932. Oct. Vol. 3. No. 10. pp. 785–793.

In this preliminary paper the author reports the production from hydatid toxalbumin of an anatoxin which is obtained by formalization (0·4 per cent.) of hydatid fluid and its incubation for a month at 39°C. The injection of anatoxin into cyst carriers produces slow desensitization accompanied by the disappearance of sensitizing antibody from the serum. Dr. Apphatie rightly points out, however, that more extensive clinical observations including experimental investigations in infected rabbits will be necessary before the exact value of this preliminary communication can be determined.

N. Hamilton Fairley.

TURNER (E. L.), BERBERIAN (D. A.) & DENNIS (E. W.). **Successful Artificial Immunization of Dogs against** *Taenia echinococcus.*—*Proc. Soc. Experim. Biol. & Med.* 1933. Feb. Vol. 30. No. 5. pp. 618–619.

A marked degree of resistance to *Taenia echinococcus* infection was induced in 8 dogs. There were 2 controls.

Examination on at least 5 consecutive days having shown that the dogs were free from infection, they were injected 5 times at 3 to 5 days' interval. The first was by 0·5 cc. of the antigen suspension subcutaneously, the other by 1 cc. intramuscularly. Two antigens were used. 1. From scolices and germinative membrane of fresh fertile hydatids of cattle dried and powdered, and for use "a 1 per cent. phenolized (0·5 per cent.) suspension was prepared." 2. From scolices, germinative membrane, and cuticular membrane from fertile and non-fertile cysts, prepared as above. Six to 15 days after the last injections had been given to the prepared dogs they and two others were fed with fresh fertile hydatid cysts. Twenty-four to 48 days later all were killed. The intestines of the 2 controls were "literally lined" with the tapeworms, 1,385 to the square centimetre. In the prepared dogs none were seen by the naked eye, but the microscope showed, 0, 1, 3, 3, 5, 6 in six while in two dying at 7 and 17 days none were found. *C. L.*

MILLER (Harry M.), Jr. & GARDINER (Margaret L.). **Passive Immunity to Infection with a Metazoan Parasite,** *Cysticercus fasciolaris,* **in the Albino Rat.**—*Jl. Preventive Med.* 1932. Nov. Vol. 6. No. 6. pp. 479–496. With 2 figs.

This paper fills in the details of the preliminary announcement (this *Bulletin,* Vol. 29, p. 748). It notes that passive immunity to infection by a metazoan parasite has been demonstrated.

This was effected by intraperitoneal injection of serum, usually amounting to 1/25th of the body weight, taken from rats which had either been already infected with *C. fasciolaris* or had had an intraperitoneal injection of 1 cc. of a suspension of *T. taeniaeformis.* Checked by controls, injection of serum from infected rats gave complete immunity, from actively immunized rats a large measure of this, while injection of normal serum showed benefit as 198 is to 276. In one series the quantity of serum was progressively lessened and infection was not obtained till the quantity injected was as little as 1/400 of the body weight and then it occurred in one of the 4 rats used.

C. L.

DÉVÉ (F.). De l'existence de formes de transition entre l'échinococcose hydatique et l'échinococcose alvéolaire chez l'homme. [**Transition Forms between Multilocular and Alveolar Hydatid of Man.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 19. pp. 223–224.

Dévé has already pointed out [*ante,* p. 213] that ORTH, WEICHSELBAUM & DEW have reported connecting stages between the multilocular hydatid of cattle and the alveolar hydatid of man. In 1906 POSSELT maintained that he had found in the heart of man the two forms side by side and with no intermediate links. Dévé by the kindness of MARESH of Vienna has obtained and examined various sections of POSSELT's original specimen and has found in them all intermediate grades of structure. *C. L.*

REBELLO (S.), DA COSTA (S. F. Gomes) & RICO (J. Toscano). Sur l'emploi des cestodes humains (*Taenia saginata*) comme réactif pharmacologique pour l'étude des anthelminthiques. [***T. saginata*** **as Test in the Pharmacological Study of Anthelmintics.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 509–510.

Proglottids of *T. saginata* expelled spontaneously or after a saline and received in water at 38°C. were employed to test anthelmintics. Movements ceased as follows in minutes : Extract of male fern 1 per cent., 55 ; infusion of Kousso 2 per cent., 35 ; of kamala 10 ; filmaron oil emulsion 1 per mille 40 ; thymol 5 " millimols " * 16 ; naphthol in same concentration 12. The action was always slower than with *T. serrata.* [Working acceptance of these figures implies of course a belief that it is these drugs themselves and not substances which the host's body produces from them that are the active anthelmintics.]

C. L.

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* 1/1,000 part of a gram molecule, this being as many grams of a substance as are numerically equal to its molecular weight.

ROMERO CALATAYUD (A.). 27 casos de teniasis por *Hymenolepis nana.* [**Infestation with** *Hymenolepis nana.*]—*Medicina Países Cálidos.* Madrid. 1933. May. Vol. 6. No. 3. pp. 208–214. [20 refs.]

The author quotes BACIGALUPO who in Buenos Aires found 8·3 per cent. of 72 children [? 6] whom he examined to be infested with *H. nana* and 1·3 per cent. of 448 adults [? 6].

Working in Professor PITTALUGA's laboratories the author examined 200 children and found 27 or 13·5 per cent. to be harbouring this cestode. Clinically, some were apparently merely carriers and showed no subjective symptoms; others had intestinal disturbances, colic, diarrhoea, etc. He did differential counts of the leucocytes of all those positive and found eosinophilia in 24 of them, the highest being 16 in two patients, one of whom had trichuris also. The infestation is certainly more common [in Madrid ?] than is generally believed.

H. H. S.

LAPAGE (Geoffrey). **Cultivation of Parasitic Nematodes.** [Correspondence.]—*Nature.* 1933. Apr. 22. Vol. 131. No. 3312. pp. 583–584.

Certain alterations have been made to McCoy's method (this *Bulletin,* Vol. 27, p. 426) such as the use of sugar instead of salt for floatation and of 10 per cent. plain broth instead of agar inoculated with *Bact. coli* for culture. To induce unsheathing 1 in 20 Milton solution is advised, but further development does not seem to have been induced, though more than 200 media have been employed. *C. L.*

CORT (W. W.) & OTTO (G. F.). **The Ascaris Problem in the United States.**—*Southern Med. Jl.* 1933. Mar. Vol. 26. No. 3. pp. 273–276. With 1 map in text. [23 refs.]

This paper sums up recent work on ascaris infection done by American writers.

In the southern United States heavy infection is particularly associated with the Appalachian range but essentially it is not a question of altitude but of defaecation habits to which surroundings of houses may contribute. Where gross pollution has been found close to the house (actually in the house yard), there will be a familial distribution of infection whether this pollution is a peculiarity of the particular family, or of the families in general in a locality. As regards treatment, santonin is held far less effective than oil of chenopodium. Combination of the latter with carbon tetrachloride is mentioned, in which connexion it is noted " records of severe symptoms and occasional deaths have been reported following the use of this drug," carbon tetrachloride being probably under reference. The use of hexylresorcinol is cited as an important step forward. In prevention the necessity of providing privies suitable for children and of seeing that they use them is stressed, as is also the harm done by the fact that a surprisingly large proportion of rural schools have either no privies at all or such poor ones that the children will not use them. The question, as in so many diseases familiar to workers in the tropics, is essentially one of economics. *C. L.*

FORSTER (Ernst). Askaridenrekord. [**Record of Ascarids.**]—*Schweiz. Med. Woch.* 1933. May 13. p. 452.

The case is published as a justification, if such were needed, for the setting up of the Ascaris Commission which has been nominated by the Central Committee of the Association of Swiss Medical Men.

A girl of 10, who had vomited 6 ascarids and had abdominal pains and visible and palpable distension of the ascending and transverse colon, was given oil of chenopodium 0·25 cc. and santonin 0·03 gm. Within 4 days she passed 1,100 ascaris, namely on the first day 3, on the second 70, on the third 1,023 with over 900 in one stool, and on the fourth day 4. Immediate laparotomy had wisely been rejected. *C. L.*

BIRK (W.). Ueber den Nachweis von Spulwurmlarven im Auswurf. [**Ascaris Larvae in the Sputum.**]—*Deut. Med. Woch.* 1933. June 2. Vol. 59. No. 22. pp. 841–843. With 1 fig.

A girl of 10, who had repeatedly passed ascaris under treatments, suffered from persistent bronchitis, and at last ascaris larvae were found in the sputum. FÜLLEBORN is quoted as informing Birk that no instance was known in which such a find had been made in man. [Evidently Birk has misunderstood FÜLLEBORN, for in an experimental infection KOINO (this *Bulletin*, Vol. 20, p. 235) reported in 1922 that larvae were found in the sputum from the 9th to the 16th day after infection, 178 being so detected on the 11th day alone.] *C. L.*

PANAGIA (Antonino). Osservazioni sullo sviluppo delle uova di *Ascaris lumbricoides* (L.). [**Development of Eggs of** *A. lumbricoides*.]—*Ann. d'Igiene.* 1933. Feb. Vol. 43. No. 2. pp. 107–119. With 14 figs. [13 refs.]

The well-known development of ascaris eggs is illustrated by microphotographs, and addition is made to observations on the effect of physical agents on eggs.

At 18°C. a solution of 10 per cent. formalin increased the period needed for development from the normal of 35 days to 60 or 70 days, and the embryos did not then live for more than 15 days. When undeveloped eggs were kept at 0°C. for any period up to 30 days, development proceeded at the normal rate and resulted in active embryos as soon as the eggs were raised to 18°C.; if kept at zero for longer than 30 days development was apt to be rather slower and an increasing number of eggs died (up to 25 per cent.) as the period of cold was extended to 60 days. If eggs were embryonated ill effects of cold became evident after 20 days, while after 60 days 80 per cent. of the eggs were dead. *C. L.*

KELLER (A. E.). **A Study of the Occurrence of Unfertilized Ascaris Eggs.**—*Jl. Lab. & Clin. Med.* 1933. Jan. Vol. 18. No. 4. pp. 371–374. With 1 fig.

" 1. A differential egg-count analysis was made on 1,103 specimens containing eggs of Ascaris lumbricoides.

" 2. In this series 26·2 per cent. of the specimens contained unfertilized Ascaris eggs alone, 32·2 per cent. contained fertilized eggs alone and 41·6 per cent. contained both fertilized and unfertilized eggs.

" 3. The relative percentage of fertilized Ascaris eggs increases with the increase in the intensity of infestation.

" 4. The smallest number of fertilized eggs were found in the very light infestations, one to five female worms. When more than five female worms are present there is a progressive increase in the percentage of fertilized eggs." *C. L.*

WAGNER (Oskar). Immunisierungsversuche bei experimenteller Askaris-Infektion der Maus. [**Immunization Experiments with Ascaris Infection of Mice.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 3/4. pp. 372–382.

As measured by the number of larva found in liver and lungs of mice (which had been fed 2 or more times with infective eggs from the pig ascaris) such infections induced considerable immunity. Feeding with dried adult ascaris produced the same effect. *C. L.*

SUÁREZ (Ramón M.). **Clinical Aspects of Uncinariasis.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1933. Mar. Vol. 8. No. 3. pp. 299–337. With 8 figs. on 4 plates & 4 charts. [24 refs.] [Spanish version pp. 338–366.]

This paper is not intended as a review of the symptomatology of hookworm infection (ASHFORD's classical work in Porto Rico dealt with that 30 years ago), but is a detailed and most important study of 21 patients with rather severe anaemia who were passing hookworm eggs, and were studied for an average of 50 days each.

Malaria, syphilis and bleeding piles were excluded. Fever was never complained of, but the temperature in six occasionally reached 38°C. and in two 39°C. The haemoglobin index was lower than Smillie's standard; thus in cases with over 400 worms it averaged 32 instead of 46. Nor did his classification into moderate and light infections on the basis of worm load hold; for cases with a relatively low worm count showed severe anaemia. Thus a child with 43 necators had 17 per cent. haemoglobin and another with 1,800 had 48 per cent. Egg counts by Stoll's method were no index of the worm load; thus of two consecutive cases tested the second had ten times as many worms but 100 times as many eggs in the faeces as the first. Malnutrition was a definite feature, for, although 80 per cent. showed oedema on admission and none on discharge, they all gained weight the average gain being 10 lbs. The summary states that in all cases kidney function as tested by phenolsulphonephthalein was unimpaired; there seemed to be relationship between oedema and nitrogen retention. All cases showed low blood cholesterol, low calcium and low serum protein, but unaltered albumen-globulin ratio. Basal metabolism lay between −33·6 and +28·4 and the idea of a subfunctioning thyroid is rejected. The cardiac condition was closely studied in 4 cases only and comment and conclusion are studiously avoided.

"All cases but 3 showed hypochromic anemia with predominant microcytosis. Three cases of macrocytic anemia found in this series were considered by the author as co-existing with the hookworm and not due to them.

" Cases responded to maximal doses of iron ammonium citrate in approximately the same length of time independently of the presence of the worms or their expulsion by vermifuge. The highest reticulocyte response was 21·6 per cent.

" Iron has been used in the treatment of hookworm anemia in Puerto Rico since a remote epoch. The Anemia Commission of Puerto Rico used Blaud and Vallet's pills to the amount of from 3 to 6 daily, in some cases. We had been using maximal doses since 1931.

" One case showed moderate response to special high organic-iron diet.

" The importance of the nutritional factor in the production of the hookworm anemia is evident in this series." *C. L.*

NISHI (M.). **Experimental Observations on the Blood-sucking Activities of Ancylostomidae, especially** *Ancylostoma caninum.*—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1933. May. Vol. 32. No. 5 (338). [In Japanese pp. 677–691. With 4 figs. on 1 plate. [15 refs.] English summary pp. 61–62.]

In all essentials a striking confirmation of the work of WELLS [this *Bulletin*, Vol. 29, p. 421].

Twenty-one dogs were anaesthetized with sodium barbital and the worms exposed, as a figure shows, in an inspection box. The rhythm of oesophageal contraction averaged 161 per minute, it was most vigorous between 38°C. and 40°C. and blood was passed by the worm about 4½ minutes after sucking began, but, if this were vigorous, in less than 1 minute. Afterwards its expulsion was periodic, about every 45 seconds at an average, but with a minimum interval of 12 seconds. As regards the waste of blood induced, it was calculated that a worm passed per rectum 0·144 cc. in 24 hours though when activity was great loss was at the rate of 0·484 cc. At the same time the waste through the worm's mouth was calculated as 0·216 cc. daily, so that taking both ends it might amount to 0·7 cc. daily caused by each worm. At the same time a surrendered bitten surface of gut bled for 26 to 65 seconds, whereas an artificially injured spot did so for 20 seconds only. As WELLS reported, biting produces engorgement of the local blood vessels. *C. L.*

DE LANGEN (C. D.). De oorzaak der anaemie bij ankylostomiasis. [**The Cause of Ankylostomiasis Anaemia.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. May 9. Vol. 73. No. 10. pp. 592–617.

The most important theories of the cause of this anaemia are :—(1) It is caused by the constant loss of blood from the intestine. (2) It is due to a helminthic secretion, which may act as a haemolysin, or on the blood forming organs to give rise to an aplastic anaemia, or prevent the normal coagulation of the blood from the small wounds in the intestine. (3) It is dependent for its development on external circumstances, such as food or hygiene. (4) It is explained by the occurrence of secondary bacterial infection through the intestinal lesions.

Laboratory workers seem to favour the theory of blood loss, while the clinician, who sees the patients with characteristic pasty look, orange-yellow colour and eosinophilia prefers that of a toxic action. In explaining this anaemia it is necessary to build upon a physiological foundation and especially to consider the process of normal destruction of erythrocytes and their regeneration. A detailed reference is made to the lipoid covering of the red blood cell, its content in cholesterin and lecithin respectively and the antagonism of these latter to one another in both a physicochemical and a biochemical sense. The actual destruction of blood erythrocytes may be taken to be a haemolysis and in this connexion the resistance of the lipoid layer of the erythrocyte would be dependent on the ratio of cholesterin to lecithin or to free fatty acids, a ratio which has received the name of the lipocytic coefficient. It is not possible here to follow the author through his entire argument and it will suffice to say that he does not favour the toxin theory as a total explanation of the cause of ankylostome anaemia, although he does not exclude it altogether. He also admits the fact of blood loss.* It is to the feeding, however, especially of the Javan in contrast to the European that he ascribes an important role in the production of the anaemia. In this food carbohydrates preponderate, protein is less than in a European diet and the protein is essentially of vegetable origin, while fats and the essential lipoids are of subordinate importance.

One concluding sentence may suffice to indicate the position taken up—" Loss of blood, poor feeding and the condition of the intestine combine together to produce a severe anaemia. Whether, in addition, a toxic injury of the bone marrow plays a part requires further research." *W. F. Harvey.*

†FÜLLEBORN (F.). Ueber die Taxen und das sonstige Verhalten der infektionsfähigen Larven von Strongyloides und Ancylostoma. II. Mitteilung.—*Zent. f. Bakt.* I. Abt. Orig. 1932. Nov. 17. Vol. 126. No. 3/4. pp. 161–180. With 12 figs. [13 refs.]

LANE (Clayton). **The Taxies of Infective Hookworm Larvae.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 237–250. [17 refs.]

As both papers are concerned with various taxies exhibited by infective larvae of Strongyloides and hookworms, it will be convenient to deal with them in the order in which they are discussed by Fülleborn.

1. *Hydrotaxy.*

Fülleborn quotes from Lane's 1930 paper [this *Bulletin*, Vol. 28, p. 228] " an animal normally living in water as a medium essential to its life can hardly have a taxis to a body of water outside that in which it is living " and points out that infective larvae of Strongyloides and Ancylostoma are not exclusively water inhabitants since they normally occur in moist soil where faeces are deposited. He describes again the formation of tufts of infective larvae at the edges of cultures and details how, as the atmosphere becomes dry, the tufts shrink and then grow again as the atmospheric moisture increases. This he regards as evidence of a positive hydrotaxy.

Lane replies to these considerations at length and points out that infective larvae are obligatorily aquatic in habit and that he uses the word *water* as meaning literally H_2O in liquid form ; declaring that a microscopic animal requires but a microscopic film of water for life. Such films must be present even in dry faecal masses else larvae could not survive in them. He discusses the various phenomena described by Fülleborn, retraction and growth of tufts, etc., and concludes that these do not constitute evidence for hydrotaxy but are to be accounted for as due to the operation of physical forces. Increase of moisture in the air leading to larger drops with consequent growth of the tufts and decrease of moisture having the opposite effect, *i.e.*, the retreating drop pulls the larvae back with it.

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* WELLS has shown that the dog hookworm, *Ancylostoma caninum*, sucks blood from the intestinal wall and that each worm rids the host daily of 0·84 cc of blood. [This *Bulletin*, Vol. 29, p. 421.] These observations have been fully confirmed by NISHI (above).

† We regret to record Professor Fülleborn's death on September 9

The two authors do not use the word *water* in quite the same terms and it is certainly difficult to escape from Lane's view of the obligatory nature of water for the continued life of infective larvae.

2. *Thigmotaxy.*

Fülleborn discusses Lane's account of the behaviour of larvae in water-filled cubical glass boxes in which they assemble at the bottom and bore against the edges and corners. He has repeated these experiments and confirms Lane's observations but points out that the so-called side-slipping shown by the larvae is not actually a lateral movement but is a dorso-lateral one since only dorso-ventral flexure occurs in nematodes. He does not agree that larvae once at an edge or corner cannot move backwards or away from it. He points out and illustrates by a photograph that the head of a larva is not always in contact with the surface against which its motion is directed. Again, if larvae are in shallow tongues of water or in a layer of water between two ridges of vaseline they bore against the air-water edge and against the vaseline. He then discusses the behaviour of larvae closely assembled together in compact groups all the individuals of which are in uniform movement like a phalanx. He agrees that when such larvae actively bore at the edge of a drop they are activated by a thigmotactic stimulus due to the surface tension at the edge. Such behaviour, he agrees, is comparable to the boring of larvae against the edges and angles of a glass box. Fülleborn does not think that contact of a larva with a resistant surface can act as a directing influence on the individual since the actual point of contact is so small as to be practically a mathematical one.

Lane defines thigmotaxy more exactly and in agreement with Fülleborn's (1924) definition, as a directing impulse produced by contact with stable objects. He rejects as misleading Pintner's modification that for the calling out of thigmotaxy the object should have holes in it. He then discusses this stimulus under two heads, Positive and Negative Thigmotaxy. Under the former, his main points are that larvae set themselves roughly at right angles to any obstacle they encounter and that in outstanding numbers they lie close to obstacles just where they would lie if influenced by positive thigmotaxy. He disagrees with Fülleborn's contention that the point of contact of the head, being but a mathematical point, can hardly have a directing influence on larval movement and points out that the anterior face of the head has six papillae which may furnish the individual with directional impulses according as first one and then another of them comes into contact with an obstacle. He insists that the setting of larvae primarily at right angles to an opposing surface is really a matter of observation. Under Negative Thigmotaxy he discusses the behaviour of closely packed waving larvae and suggests as an explanation that it may be due to a negative thigmotaxy possessed by larvae when touching on their dorsal and ventral surfaces. With larvae closely packed, a retraction of one larva will bring its opposite surface into contact with its neighbour which also will shrink away at the point touched. In this way the swaying rhythmical movement of the whole group may be brought about. Finally he indicates the implications of thigmotaxy in relation to skin penetration and considers that it is of all others the taxy most essential for the preservation of the individual and the one chiefly concerned in the act of skin penetration.

There seem to be but small grounds of difference between the authors on this taxy; the chief one being on the possibility of the directional stimulus of the individual larva through contact of its head with an obstacle.

3. *Behaviour of Larvae in narrow spaces.*

Larvae in water confined in narrow tubes, the width of which is less than their length, bore the head against the side of the tube. The body, however, cannot complete its usual movement, the middle region becoming pressed against the wall where it remains motionless for a short time. The head then jerks to the other side of the tube and the body movement is repeated. This motion becomes spasmodic and of such a nature as to suggest that it is purposive for the liberation of the larva from a confined space.

4. *By what Mechanical influence is the motion of larvae incited?*

The serpentine movement of larvae is excited when the head end comes into contact with some kind of resistance or when the larvae suffer from lack of space. It is also actively called out by pressure on any other part of the body tending to pin it down. *e.g.*, when threads of glass wool rest on it; the larva tries to extricate itself.

5. *Positive Oxygen and Negative Carbon Dioxide Taxy of Strongyloides Larvae.*

Fülleborn showed in his 1924 paper, by means of a double gas chamber, that Strongyloides larvae exhibited a positive taxy to oxygen and a negative one to carbon dioxide. In his 1930 paper, Lane brought forward certain observations of BOYCOTT'S on the resistance of infective larvae to lack of oxygen and excess of carbon dioxide. Fülleborn (1932) now replies that these considerations are irrelevant since BOYCOTT was dealing with infective hookworm larvae whereas his own observations were made on Strongyloides larvae. Lane (1933) confesses to continued scepticism as to the validity of the conclusions drawn by Fülleborn on these taxies.

6. *Lane's "Chemical Activation."*

Lane (1930) observed activation of hookworm larvae on the addition of serum and considered that some substance from the serum had penetrated the sheaths and stimulated motility. He concluded that nutritive substances might also pass through the sheath and thus serve to nourish the enclosed larvae, thereby prolonging life. Fülleborn (1932) suggests that the activation observed on the addition of serum was probably caused by the production of a stickiness of the cuticle giving rise to a clumping effect such as he had described in his 1924 paper for Strongyloides larvae. He considers it as improbable that nutriment is taken in through the sheath but that the sole nourishment of the larva is its store of reserve food. Lane (1933) replies that the weak solutions of serum which he used produced no stickiness or clumping of the larvae. He still considers it probable that nutrients can pass through the sheath to be used by the enclosed larvae and reasonable to doubt whether the food reserves stored in the body constitute the larva's sole nourishment.

7. *Rheotaxy.*

Fülleborn refers to his 1924 paper in which he had shown that, when active Strongyloides and Ancylostoma larvae are introduced into a narrow tube through which water is streaming, they turn and head up-stream whereas in wider tubes they do not do so. He criticizes Lane's (1930) objections as to the validity of this evidence for occurrence of rheotaxy and says that had Lane carefully repeated his experiments he could not have failed to observe the effect. He thinks, however, that Lane's suggestion that the phenomenon is due to the shape and balance of the organisms is worthy of consideration and describes experiments in which he used models of larvae, made from strips of wood and with heavy heads, which headed up-stream when placed under the requisite conditions. He agrees that it may be true that this purely physical reaction may also account for the behaviour of Strongyloides and hookworm larvae. Lane (1933) states that his account of the behaviour of larvae in a stream was based on his own experiments and was not a criticism of Fülleborn's experiment. He reaffirms his belief that the phenomenon is adequately accounted for merely by the action of physical forces since even motionless larvae turn and head up-stream.

8. *Thermotaxy.*

Fülleborn (1932) discusses Lane's objections to this taxy and shows by photographs that both hookworm and Strongyloides larvae are directionally stimulated by heat and move over the surface of agar or through it towards the source of heat. Free-living nematodes, on the other hand, although showing increased activity on stimulation by heat, do not move towards the source of heat. He then considers the significance of thermotaxy in relation to skin penetration and thinks that it is of practical importance in this respect.

Lane (1933) discusses his former attitude to thermotaxy, namely activation by heat, and concludes that it will not account for all the observed phenomena. He recognizes the directive stimulus of heat on larvae on or in agar and concludes that it must act in the same way on larvae in water where their movements cannot be due merely to convection currents set up by heat. On the significance and importance of thermotaxy for skin penetration he is, however, still sceptical and points out that there are several well attested cases of infective larvae which are positively thermotactic but which are not skin penetrators. He cites the case of *Bunostomum phlebotomum* which, though positively thermotactic, failed to exhibit the response when thigmotaxy had already been induced by contact with a surface or with the edge of a drop. He concludes that thermotaxy is less effective as a directive influence than thigmotaxy and consequently is less important in relation to skin penetration.

9. *Phototaxis and other Taxies.*

Strongyloides larvae show no evidence of phototaxy. For Barytaxy, Tonotaxy and Electrotaxy, Fülleborn directs attention to his 1924 paper.

10. *The Technique of Larvae Investigations.*

Fülleborn gives particulars for the culturing of Strongyloides and hookworm larvae by the funnel method, etc., and the use of agar plates for experiments with larvae. *T. Goodey.*

HUDSON (Ellis H.) & YOUNG (Agnes L.). **Hookworm Disease in the Arab of the Middle Euphrates.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 207–212.

Of the method of diagnosis it is written " most of the stools were examined by cultural or centrifugation methods." In 5,400 consecutive out-patients in Deir-ez-Zor hookworm infection was proved 109 times, four-fifths being males and most of them under 30 years. In children infection is believed to be undoubtedly heavy. The patients come from the middle Euphrates and its two tributaries in Syria; and 38 per cent. of 308 Arabs working on the Euphrates 60 miles east of Deir-ez-Zor were found infected, an indication for further investigation. This appears to be the first time that ankylostomiasis has been reported from this region where, with syphilis and amoebic dysentery, it constitutes a major problem. *C. L.*

CASTEX (Mariano R.) & GREENWAY (Daniel). La ancylostomiasis en la Provincia de Buenos Aires. [**Hookworm in Buenos Aires Province.**]—*Prensa Méd. Argentina.* 1932. Dec. 30. Vol. 19. No. 21. pp. 1284–1286.

Two cases are recorded and others are referred to, tending to show that in the Province of Buenos Aires (San Isidro, Olivos, Martinez, Villa Ballester and Moron are specifically mentioned) cases of indigenous hookworm infestation occur, and it is stated that the dangers of extension in the northern parts of the Province are considerable. The authors use this as a reason for calling the attention of the health authorities to the need for investigation to determine the actual prevalence of ankylostomiasis at least in that part of the Province.

H. H. S.

GUNEWARDENE (Hugh O.). **The Cardiac Complications of Ankylostoma Infection with Special Reference to a Presystolic Murmur occurring in these Cases.**—*Jl. Trop. Med. & Hyg.* 1933. Feb. 15. Vol. 36. No. 4. pp. 49–53. With 5 figs.

These cases are reported from Ceylon by one who for about 7 years was clinical assistant, National Hospital for Diseases of the Heart. Five types of case are described. 1. Pregnant women with myocardial damage. 2. Cardiac failure with pulmonary congestion. 3. Anaemia and dyspnoea. 4. Hookworm infection with organic valvular disease. 5. Cardiac murmurs, systolic or presystolic with irregular pyrexia, all clearing up on disinfestation and blood improvement. 6. Any of the above in pregnant women.

" Heart disease due to ankylostoma infection might justly be called the " poor man's heart disease " of the tropics. In practice, in high society they are rare. For six years I have not seen one such case. Its frequency among the poor, and often the helpless poor, should be an incentive to further study, particularly in view of the fact that the sequelae of this infection can, as I hope I have shown, be easily mistaken for organic valvular disease and consequently labelled ' incurable.' " *C. L.*

LAMBERT (S. M.). **Hookworm Disease in the South Pacific. Ten Years of Tetrachlorides.**—*Jl. Amer. Med. Assoc.* 1933. Jan. 28. Vol. 100. No. 4. pp. 247–248.

" I report :—

" 1. One hundred and fifty thousand consecutive mass treatments of hookworm disease with the tetrachlorides without a death.

" 2. More than 100,000 consecutive treatments with carbon tetrachloride without a death and with few untoward symptoms.

" 3. More than 46,000 treatments with tetrachlorethylene without a death and without untoward symptoms."

[Such is the author's trumpet call. We must not let it deafen us to certain quiet voices. For example BLACKIE'S, in a death reported from Rhodesia (this *Bulletin*, Vol. 29, p. 314); ZIYA Bey's 1 death in 1,200 (HUSSAMEDDIN, *loc. cit.*, Vol. 29, p. 420); NAG'S 3 deaths in 289 children (*loc. cit.*, Vol. 28, p. 179); and of less recent reports STRAUB'S, 2 deaths in 400 Chinese and Klings (*loc. cit.*, Vol. 23, p. 479), KOUWENAAR'S, 4 deaths (*loc. cit.*, Vol. 23, p. 479); BAIS'S, 3 deaths in 15,000 (*loc. cit.*, Vol. 21, p. 582); the tragedy in Assam which grievously checked the hookworm campaign there; and others. The clarion note may have a very grave issue.] *C. L.*

MOLLOY (Daniel M.). **The Treatment of Hookworm and Other Intestinal Helminth Infections with Hexylresorcinol under Field Conditions in Central America. A Preliminary Report.**—*Southern Med. Jl.* 1933. July. Vol. 26. No. 7. pp. 575–582. [18 refs.]

"A total of 1,784 treatments of hexylresorcinol were administered during the course of our experiments. We observed no toxic symptoms from the drug. Slight gastric irritation occurred occasionally, but nausea was rare and vomiting did not occur.

" On account of the action of hexylresorcinol on the gelatin of capsules, the drug is best administered in sugar-coated pills

" Full therapeutic (1·00 gram) doses of the drug removed from 65 to 72 per cent. of hookworms under field conditions. The efficacy of the drug is greatly lessened if it is not given on an empty stomach or if food is taken shortly after administration. Clearing the intestinal tract of extraneous matter by a preliminary purge would probably increase the efficiency of the drug and this would be a recommendable procedure in the treatment of individual cases.

" In the treatment of ascaris infections the drug is probably without an equal. From 93 to 98 per cent. of the ascarids harbored by the individuals treated were expelled by a single treatment.

" In the treatment of whipworm infestations the drug appears to be less effective than earlier reports indicated. It would, however, appear to be the most effective drug we have against this parasite at the present time. Only higuerolatix (the latex of the wild tropical fig, *Ficus laurifolia*) removes a larger percentage of the worms.

" The administration of a purge two hours after the drug lessens its anthelmintic effect. On account of its delayed action, phenolphthalein may be administered simultaneously with the drug without lessening its efficiency against hookworms and ascaris. If saline purgatives are employed, these should not be administered until several hours later, preferably the following morning.

" In the treatment of hookworm disease, a single dose of hexylresorcinol lessens the worm burden to the extent that the patient is relieved of most of the symptoms. It does not, however, entirely eliminate the danger to others, since the majority of individuals treated still harbor a sufficiently large number of worms to be considered ' carriers.' In treatment campaigns which are being conducted for the purpose of reducing mass infection, a second treatment (preferably of some anthelmintic which possesses a more selective action against hookworm, tetrachlorethylene, carbon tetrachloride or thymol), would seem to be indicated." *C. L.*

BUCKLEY (J. J. C.). *Necator suillus* **as a Human Infection.** [Memoranda.]—*Brit. Med. Jl.* 1933. Apr. 22. pp. 699–700.

Eggs of adult necators, obtained by killing pigs in Port-of-Spain, were cultured in soil and sterilized pig's faeces. Eleven applications of infective larvae, averaging about 80 larvae each were made to the skin of the forearm of man between 29th July and early September; about 60 inflammatory lesions in all followed.

Eggs appeared 54 days after the first application and their passage continued for 4 months. Oil of chenopodium produced 1 male and 2 females. " Owing to the close resemblance between *N. suillus* and *N. americanus* such infections might easily be overlooked, for *N. suillus* is readily mistaken by naked eye examination alone for an incompletely grown *N. americanus.* Microscopical examination of all suspected specimens would be necessary in order to estimate the incidence of *N. suillus* in human beings." [The assumption underlying the acceptance by helminthologists of *N. suillus* as a morphological species seems to depend on reported differences of a grade which the anthropologist does not accept as sufficient to exclude the Hebrew, the " Aryan " or the Australian aborigine from the species *Homo sapiens.*] *C. L.*

MAPLESTONE (P. A.). **Creeping Eruption produced by Hookworm Larvae.**—*Indian Med. Gaz.* 1933. May Vol. 68. No. 5. pp. 251–257. With 1 fig. [28 refs.]

By careful, controlled work it is shown that creeping eruption in man may be produced by infective larvae of *Ancylostoma braziliense, A. caninum, A. duodenale,* or *Necator americanus* each in pure culture; and while there is full appreciation of the work which has been done on this matter in the last few years, there is insistence of the debt owed to earlier writers and particularly to C. A. BENTLEY in 1902.

Purity of specific source was insured by using eggs either obtained by dissection of specifically identified female worms or from faeces shown by subsequent autopsy to contain eggs of one hookworm species only. The eggs were cultured in heated and helminth-free earth for 9 days, the infective larvae were extracted, a known number placed on a skin, and the excess of water taken up by sprinkling with powdered helminth-free earth. The attempt to separate ground itch from creeping eruption, or different types of creeping eruption from one another, is deprecated. Regarding the failure of workers to obtain evidence of intestinal infection after the application of larvae of *A. braziliense* to the human skin, Maplestone shows that such infection may in fact be acquired. The eggs are small measuring 0·053 mm. long in strong saline; they appear after about 5 weeks, 3 or 4 in a D.C.F. preparation; *A. braziliense* has been recovered after an anthelmintic and when this has not been given the eggs have spontaneously disappeared after a very few days. Maplestone is convinced that he would have missed the infections he discovered had he used any other method of stool examination. *C. L.*

McCarthy (Lee). **Creeping Eruption due to** ***Ankylostoma braziliense.*** —*Arch. Dermat. & Syph.* 1933. Mar. Vol. 27. No. 3. pp. 490–497. With 2 figs.

That the eruption was caused by a nematode larva was proved by microscopic sections of excised skin. That the larva was *A. braziliense* is mere inference from writings by Kirby-Smith, *et al.* Creeping began 3 months after the presumed date of infection. *C. L.*

Faust (Ernest Carroll) & Kagy (Edwin S.). **Experimental Studies on Human and Primate Species of Strongyloides. I. The Variability and Instability of Types.**—*Amer. Jl. Trop. Med.* 1933. Jan. Vol. 13. No. 1. pp. 47–65.

Summary and conclusions :—

" 1. This paper presents experimental evidence showing the behavior of strains of Strongyloides obtained from primate hosts and from human hosts.

" 2. Previous studies by the writer have demonstrated the different capacities of macaque, ateles and human strains of Strongyloides, to establish themselves in autochthonous and reciprocal hosts. This investigation presents evidence based on inoculation of man, the macaque and the dog with chimpanzee, macaque, capuchin and human strains.

" 3. Repeated passage of pure type human strains through canine hosts invariably produced alterations. These tended to simplify themselves into the direct type of development. Passage of the chimpanzee strain through dogs failed to modify it from the original indirect type, but in man the stability was reduced. The organism bred true to type in the macaque but after this passage was unable to develop in dogs.

" 4. Change from the hyperinfective and indirect types to the direct type was accompanied by a decrease in the virulence of the organism and increased failure to establish itself in the canine host. This is in direct contrast with the increased virulence and greater ease of establishing itself in the case of the unmodified chimpanzee strain during successive passages through dogs.

" 5. The data established by this investigation provide proof as to the instability and variability of the several strains of Strongyloides studied." *C. L.*

McCoy (O. R.), Miller (J. J.), Jr. & Friedlander (R. D.). **The Use of an Intradermal Test in the Diagnosis of Trichiniasis.**—*Jl. Immunology.* 1933. Jan. Vol. 24. No. 1. pp. 1–23.

" 1. Of 36 persons ill with trichiniasis (*i.e.*, two to six weeks after infection) 25 (70 per cent.) gave positive immediate skin reactions following intradermal injection with 0·1 cc. of a 1 : 10,000 dilution (in terms of dry weight of powder) of a saline extract of *Trichinella spiralis* larvae. An additional 8 reacted to a 1 : 500 dilution of the antigen making a total of 33, or 92 per cent. positive.

" 2. Of 39 persons tested from three to twenty-two months after infection, 19 (49 per cent.) reacted to the 1 : 10,000 dilution and an additional 12 were positive to a 1 : 500 dilution, a total of 31 or 80 per cent. positive.

" 3. Of 13 persons ill three and one-half to seven and one-half years prior to the test, 3 (23 per cent.) were positive to the 1 : 10,000 dilution, and 5 more reacted to the 1 : 500 dilution, a total of 8 or 62 per cent. positive.

"4. One hundred and four control persons from Rochester, New York, showed an incidence of 9 per cent. positive with the 1 : 10,000 dilution and a total of 18 per cent. positive with both the 1 : 10,000 and 1 : 500 dilutions. Forty-seven control persons from San Francisco, California, showed an incidence of only 4 per cent. positive to the 1 : 10,000 antigen and 6·5 per cent. positive with both the 1 : 10,000 and 1 : 500 dilutions.

"5. Ninety-two persons from southern Louisiana infected with *Trichuris trichiura* showed an incidence of 18 per cent. positive with the 1 : 10,000 dilution and a total of 62 per cent. with both the 1 : 10,000 and 1 : 500 dilutions."

"From a practical standpoint the trichinella skin test cannot be considered a certain diagnostic test. It appears that a negative test will probably prove more useful in ruling out the diagnosis of trichiniasis than a positive one in establishing it. A positive test, however, definitely strengthens the evidence for the diagnosis and may justify further search for the parasite. Positive tests obtained with antigen dilutions of 1 : 10,000 or higher are of more definite diagnostic value than those obtained with lower dilutions. A year's experience in using the skin test in hospitals where trichiniasis not infrequently occurs leads the present authors to the conclusion that it may be a valuable aid in the diagnosis of the disease."

The reactions were immediate ones and were held positive when there was a wheal at least 7 mm. and an erythema at least 20 mm. in diameter. *C. L.*

HELLER (M.). Entwickelt sich die *Trichinella spiralis* in der Darmlichtung ihres Wirtes? [**Development of *T. spiralis* in the Gut Lumen of the Host?**]—*Ztschr. f. Parasitenk.* 1933. Feb. 16. Vol. 5. No. 2. pp. 370–392. With 8 figs. [31 refs.]

Experiments on rats and kittens led to the conclusion that trichinella larvae are freed from their cysts rapidly—as soon as the meat containing them is digested. They then immediately attach themselves to the mucosa of the small intestine, a prerequisite for their further development, and without it (as when enclosed in a collodion sac) there is commonly no development up to 96 hours. Within the mucosa, however, they become sexually mature in 24 hours, are fertile with embryonic development beginning in 48 hours, the embryos are complete in 66 to 78 hours, are hatched within the uterus, and are posited in 80 to 90 hours. Leaving the lumen of the small intestine they bore in 12 hours into the connective tissue of the villi on which they live and which they damage as they grow to maturity. The investigation seems to have been limited to the study of the intestine. *C. L.*

TRAWIŃSKI (A.) & MATERNOWSKA (I.). Ueber Invasionsfähigkeit junger Muskeltrichinen. [**Invasiveness of Young Muscle Trichinae.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. May 22. Vol. 128. No. 5/6. pp. 328–331.

Nineteen days after infection is the shortest time in which trichinae appear in muscle in a state of full development and infective possibility. Though not encapsuled, their own chitin carries them safely through the stomach without digestion. The failure of younger larvae to infect a new host is due to lack of development and not to the effects of gastric juice. *C. L.*

Doerr (R.) & Menzi (Elsa). Studien ueber den Mechanismus der Trichinelleninfektion. VIII. Mitteilung: Vergleichende Untersuchungen ueber die Empfänglichkeit der Ratte und des Meerschweinchens für die Infektion per os. [**Susceptibility of Rat and Guineapig to Trichinella Infection per os.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Apr. 28. Vol. 128. No. 3/4. pp. 177–188. [10 refs.]

In the rat, feeding with 3 Trichinella larvae always produced infection, but feeding with two did not always do so, presumably because the chances of a pair were smaller with two only; in the guineapig, 8 larvae always failed, 10 to 40 generally failed, to infect, and larger numbers were not tried apparently. Within these limits, intensity of infection ran parallel with numbers of larvae eaten; with over 3,000 trichinella larvae both species became equally infected.

C. L.

Penso (G.). Nouvelles considérations sur la biologie des oxyures. [**Biology of Oxyuris.**]—*Ann. Parasit. Humaine et Comparée.* 1933. July 1. Vol. 11. No. 4. pp. 268–270.

Penso brings forward, as confirmation of his view that oxyurids complete their life-cycle in one host [this *Bulletin*, Vol. 29, p. 765], a statement by Wetzel (1931) that in *Dermatoxys veligera* of the hare he has demonstrated larvae in the thickness of the mucosa. But while Wetzel believed that the larvae were entering the mucosa, Penso is satisfied that they were doing just the reverse, and that the cycle of evolution of this group of parasites is thus completely clarified and demonstrated. *C. L.*

Brown (H. W.). **Treatment of Pin Worm** (*Enterobius vermicularis*) **Infestation with Hexylresorcinol.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Nov. Vol. 30. No. 2. pp. 221–224.

" 1. Hexylresorcinol is very active on *Enterobius vermicularis*, a 1–1,000 suspension killing them in 2 minutes. 2. Five out of 6 people treated with hexylresorcinol pills by mouth and enemas became free of their enterobius. Two out of 3 people treated by enema only became free of enterobius. Although this is not sufficient data to judge which method is the best, the life history of the worm indicates need of both oral and enema treatment. 3. Suggested outline of treatment. Treat twice a week in the morning as follows: (*a*) Omit breakfast; no food until noon. (*b*) Hexylresorcinol pills orally, 0·1 gm. per year of age up to 10 years of age, maximum dose after this age 1·0 gm. Drink plenty of water. (*c*) Soapsuds enema and after its evacuation an enema of 1 part crystalline hexylresorcinol in 1,000 cc. of water; this enema to be given high and retained 5 minutes. (*d*) Bed sheets to be boiled at least twice weekly to destroy eggs or worms passed on them." *C. L.*

LIENGME (A.). De l'appendice vermiforme à coprostase et de l'appendicite à oxyures. [**Appendicitis in Relation to Thread Worms.**]—*Arch. Internat. Méd. Expérim.* 1932. Dec. Vol. 7. No. 4. pp. 709–745. With 4 figs. & 5 plates. [172 refs.]

It is concluded that faecal stasis in the appendix originates in the foetus, that it favours the migration of *E. vermicularis* into the appendix, but that the worm does not produce appendicitis. *C. L.*

i. RODENWALDT (Ernst). *Microfilaria malayi* im Delta des Serajoe. I. [*Mf. malayi* **in Java : its Morphology.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1933. Vol. 22. No. 1. pp. 44–54. With 1 folding map. [10 refs.]

ii. ——. Zur Morphologie von *Microfilaria malayi.*—*Ibid.* pp. 54–60. With 2 figs.

i. At this spot on the south coast of Java, the only microfilaria found was *Mf. malayi*. In places lying about highwater mark the percentage of blood infection was high (Boenton 41, Wlahar 29, Rawalo 33, Karangandri 24) ; on the edge of the delta the rate lies between 4 and 9, and 15 kilometres away falls to 0·66. Periodicity is nocturnal.

The relationship of microfilariae in the blood to elephantiasis was computed in two ways. Firstly, the percentage of embryo-carriers among those with elephantiasis was much smaller than in those without elephantiasis ; secondly, in localities where the incidence of embryo-carriers was high elephantiasis was high and *vice versa* ; in over 24,000 persons examined and arranged by localities this positive correlation was marked.

Development to the infective larval stage has been traced in *Taeniorhynchus annuliferus, T. uniformis, T. indianus,* and *Anopheles sinensis.* It can be excluded in *Culex bitaeniorhynchus, C. fatigans, C. vishnui, C. alis, C. withmorei, C. sinensis.*

ii. The anatomy of *Mf. malayi* as disclosed by vital staining (Azur II, 1 in 3,000) is described and pictured. The distinctive features are :—

The excretory cell, as in *Mf. loa,* lies 2 larva-breadths behind the excretory pore and not close to it as in *Mf. bancrofti,* and the pore opens on a papilla. The internal body is as it is in *Mf. bancrofti,* whereas it is of course absent in *Mf. loa.* Cell G1 lies close to its hinder end and not at an interval from it as in *Mf. bancrofti* ; it is large as in *Mf. loa* whereas in *Mf. bancrofti* it is much smaller. Cells G2 to G4 lie about midway between G1 and the anus and not nearer to the latter as in *Mf. bancrofti.* The tail is slender and variable, in contrast to the stiff tail of *Mf. bancrofti,* and it thins and thickens. The tail nuclei are looked on as artefacts.

C. L.

BRUG (S. L.) & DE ROOK (H.). Filariasis in Nederlandsch-Indië, IV. [**Filariasis in Dutch East Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Feb. 28. Vol. 73. No. 5. pp. 264–279. With 2 graphs & 1 fig. English summary.

"A review is given of hitherto unpublished filaria-indexes and elephantiasis-indexes found in the Malay Archipelago. New material, received from New Guinea and from Melanesia contained exclusively *Mf. bancrofti. Filaria malayi* does not seem to spread further eastward than the Moluccas and the Lesser Sunda Islands."

The figures show that in Borneo of 1,039 adults examined 319 showed *Mf. malayi*, none *Mf. bancrofti*, the percentage of infected varying from 8 to 48. In Celebes of 246 examined percentages of infections lay between 57 and 67, all with *Mf. malayi*. In Kl. Soenda, Isle of Flores, and in Soemba the figures were mixed. In New Guinea 50 per cent. of 251 examined were infected, all with *Mf. bancrofti*.

" In North Ceram, where *F. bancrofti* occurs only very sporadically, a village to village investigation was made into the correlation between the occurrence of *F. malayi* and that of elephantiasis. In all 30 villages were investigated. A positive correlation (0·74 ± 0·08) was found.

" Further research failed to confirm the thesis (Brug, 1931) that the filaria malayi-index of patients with elephantiasis is greater than that of healthy people from the same region. In many areas the former was found to be inferior to the latter, just as has been observed repeatedly in bancrofti infected regions.

" Some observations were made on the development of *Mf. malayi* and *Mf. bancrofti* in mosquitos. *Mf. malayi* could be traced in *Mansonia (Mansonioides) uniformis* till the final mobile stage, but by lack of material the localization in the proboscis could not be seen. Normal development of this species until the seventh day was seen in *Anopheles bancrofti*. In *Anopheles parangensis* no development was seen.

" The development of *Mf. bancrofti* from Upper Digul River (New Guinea) in *Culex fatigans* was completed in two specimens only as against 11 ones that remained negative. *C. fatigans* has been very recently imported in the Upper Digul area; *F. bancrofti* has been carried for a very long time in this region by other mosquito species and possibly in this way it has lost its capacity for development in the former species." *C. L.*

Feng (Lan-Chou). **Household Mosquitoes and Human Filariasis in Amoy, South China.**—*Chinese Med. Jl.* 1933. Feb. Vol. 47. No. 2. pp. 168–178. With 12 figs. on 1 plate. [11 refs.]

" 1. Observations on human filariasis and household mosquitoes made in July and August 1931 in Amoy are reported.

" 2. Of 161 prisoners examined 22 were found infected with *Microfilaria bancrofti* and one with *M. malayi*. The findings do not represent the incidence of this infection of the local population because most of the prisoners found infected were not natives of Amoy. It is suggested that filariasis is probably not a very common disease in Amoy, the incidence being probably much lower than that in other parts of Fukien province.

" 3. The case infected with *Microfilaria malayi* came from Wenchow, Chekiang. Blood smears obtained from Huchow of the same province also contained *M. malayi* but not *M. bancrofti*. It is suggested that filariasis due to *M. malayi* may be a common infection in this particular province.

" 4. Of the fourteen species of mosquitoes caught *Culex fatigans, Armigeres obturbans, Aedes aegypti, Aedes albopictus* and *A. minimus* seem to be the commonest species found in houses at least in the period when the present observations were made.

" 5. *Culex fatigans* was the only species of mosquito found infected with *M. bancrofti*. It seems possible, however, that *C. fatigans* is not such a good carrier as *A. hyrcanus* var. *sinensis* and the comparatively small number of the latter may account for the low incidence of filariasis in Amoy.

"6. Six *A. minimus* were also found infected with microfilariae but the embryos had a quite different structure from those of *M. bancrofti*. The nature of these embryos is not determined." *C. L.*

IYENGAR (M. O. T.). **Filariasis in Trivandrum.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 921–938. With 4 maps & 4 charts.

Trivandrum, the capital of Travancore State, lies on the western sea-coast of India. Iyengar's conclusions on his work are these :—

"1. Microfilariae observed in man in Trivandrum are those of *W. bancrofti*.

"2. The gross microfilaria rate of Trivandrum is 10·5 per cent. The flat low-lying area in the centre of the city has microfilaria rates of 15 to 20 per cent. The outskirts of the city have low infection rates.

"3. A combination of the microfilaria rate and the filarial morbidity rate is a better measure of filarial endemicity than either of the two data by themselves.

"4. The gross filarial morbidity rate is 33·1 per mille. The central areas of Trivandrum have high filariasis rates (over 70 per mille). The incidence of filariasis in the outlying areas is comparatively low. Elephantiasis of the limbs is the most common affection and constitutes 53 per cent. of the filarial affections.

"5. There is a high degree of positive correlation between the microfilaria rates and the filarial morbidity rates. Areas with a high microfilaria rate have a high incidence of filariasis, and vice versa.

"6. The chances of finding microfilariae in filarial subjects vary inversely as the duration and severity of the affection. Microfilariae are comparatively more frequent in early stages of filarial disease, such as lymphangitis, than in later stages, such as elephantiasis of the leg.

"7. The earliest age for the presence of microfilariae in peripheral blood as observed in Trivandrum is 2½ years, for the occurrence of lymphangitis 8 years and for elephantiasis of the leg 11 years.

"8. There is a fair degree of positive correlation between the microfilaria rate and the average infestation (average number of microfilariae per positive film).

"9. Filariasis rate and filarial endemicity rate vary directly with age. The microfilaria rate also shows a rise with age but, after the 25th year, it is nearly at the same level.

"10. *Culex fatigans* is the transmitter of the infection in Trivandrum. The natural infection rate in *Culex fatigans* varies in the different sections of Trivandrum and bears a close relation to the extent of infection among the human population." *C. L.*

ACTON (Hugh W.) & RAO (S. Sundar). **The Pathology of Elephantiasis of Filarial Origin.**—*Indian Med. Gaz.* 1933. June. Vol. 68. No. 6. pp. 305–315. With 4 figs.

The authors' view is that while *Wuchereria bancrofti* is primarily responsible in all cases for lymphatic damage, the pathological conditions in a large number of advanced cases of elephantiasis are due to superimposed bacterial infection.

In dealing with lesions due to filarial toxin, they write: "The adult filarial worms live in the main lymphatics and in the hila of the glands draining the extremities. . . . In many instances, however, the adult worms and embryos are found lying on the distal side of an enlarged or fibrosed gland, so that the embryos are not able to reach the blood stream." "Hyperfilariation" [the authors do not employ the term] is instanced in a group of enlarged inguinal glands excised at operation containing many mature filariae; two of the 3 microphotographs illustrating this point show the intrauterine embryos extended, and the third ova apparently from a uterine section nearer the ovary. [It would have been interesting to know the hour of operation.] It is pointed out that although the microfilaria rate is a good practical guide for the incidence of filariasis in a population, the absence of embryos in the blood is no evidence that filariasis is absent; in the case just mentioned, for instance, there were no microfilariae in the blood. "When there is no obstruction and microfilariae are present in the blood, there is a constant high eosinophilia indicating the leakage of toxins into the peripheral blood. . . . Where there is partial obstruction the average eosinophilia shows a distinct decrease." In elephantiasis where the lymphatic obstruction is complete there is no indication of the toxin in the blood and the eosinophil count is practically normal. Under anaphylactic symptoms are cited cases with migraine, fever, and joint and muscle pains. Dermal tests, using as antigen adult guinea worms, embryos of *W. bancrofti*, and hydrocele fluid were not specific; using dirofilaria antigen prepared by Fairley's technique most cases showed positive reaction "but, surprisingly, a few cases of chyluria, heavily infected with microfilariae in the blood, showed no reaction at all."* It is shown that individual susceptibility of infected persons to lymphatic obstruction is most marked.

In lesions due to secondary infection it is held that in a large percentage of infected persons the worms prepare a nidus for bacterial infections. "Streptococci bring about acute attacks of lymphangitis, cellulitis or periadenitis producing elephantiasis." Of elephantiasis it is written that its first stage is that of static oedema due to the influence of filarial toxin on the tissue permeability, and in it periodically a pea-sized lump appears and travels slowly downwards before disappearing. "This small lump is an aberrant migrating parasite." Its second stage is that of blubbery tissue with recurrent lymphangitis and abscess which may be either helminthic or bacterial in origin. Its third is brought about by the addition of secondary infection of the skin usually from foci situated on the skin surface.

C. L.

LLOYD (R. B.) & CHANDRA (S. N.). **Complement-Fixation in Filariasis.** —*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 1197–1208.

Regarding the antigen used it has been obtained by two methods (1) a plain alcoholic extract of powdered dry *Dirofilaria immitis*,

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FAIRLEY in the first few cases used 0·25 cc. of a 1 per cent. extract as antigen, but owing to the severity of the local and general reactions noted, this was reduced to 1/10 this strength in all subsequent cases. Rao and Acton appear to have entirely overlooked this point in FAIRLEY's original paper. They employed 0·1 cc. of a 1 per cent. extract diluted with an equal volume of saline, and so presumably were employing twice the amount of immitis antigen advocated by FAIRLEY.—*N. H. F.

(2) one derived from the acetone-insoluble lipoids of this worm by the process used by BORDET & RUELENS for syphilitic antigen. The authors add "we have been very satisfied with the results obtained by this latter antigen, which is undoubtedly to be preferred to the plain alcoholic extract." They conclude:—

"1. A series of eighty-nine cases of various clinical types of infection with *W. bancrofti* has been examined by the complement-fixation reaction, using as antigen extracts, variously prepared, of *D. immitis*. Twenty-three positive reactions were obtained. A series of fifteen cases of infection by other helminths was also similarly examined, yielding three positive reactions, all of which were in guinea-worm disease.

"2. It is shown that cases of acute or sub-acute lymphangitis tend to exhibit two distinct types of immunity response. In one type the finding is a positive complement-fixation reaction associated with an eosinophilia, the total white count and polymorphonuclear percentage being within normal limits. In the other type the finding is a negative complement-fixation reaction with a polymorphonuclear leucocytosis. We conclude, accordingly, that there are two distinct types of attack in such cases which we designate the toxic and septic types respectively.

"3. Repeated examination by the complement-fixation test of cases of acute or sub-acute lymphangitis with a positive complement-fixation reaction has demonstrated that as the attack passes off the reaction becomes negative.

"4. The positive complement-fixation reaction, in whatever type of filarial lesion it may be found, is always associated with an eosinophilia, and, so far as we can see at present, the disappearance of the positive complement-fixation reaction does not seem to affect the eosinophilia, though this point requires further examination.

"5. As a result of various considerations, we have suggested that the preliminary immunity response in infection by *W. bancrofti* is anaphylaxis plus an eosinophilia, and that in circumstances favourable to large releases of filarial toxin the positive complement-fixation reaction is superadded as a further stage of immunization, the clinical result of the increased toxin releases being an 'attack' in types of obstruction where the toxin releases are normally small, such as in blockage of the limb lymphatics, but no attack in circumstances where the lymphatics are still freely open as in chyluria.

"6. Two cases are referred to showing the effect upon the positive complement-fixation reaction of surgical treatment of the antigenic factor.

"7. Of four cases of guinea-worm disease three reacted positively, and the positive reaction remained unchanged for long periods. The long duration of the positive reaction is probably due to the absence of lymphatic obstruction, bringing our findings in guinea-worm disease into line with Fairley's findings in *L. loa* and our own findings in chyluria. As in chyluria, eosinophilia was present in the one case of guinea-worm disease which yielded a negative complement-fixation reaction as well as in those which reacted positively. Adequate facilities for the study of guinea-worm disease are not available in Calcutta, but it is suggested that examination of this test will probably not only lead to a valuable means of diagnosis of guinea-worm disease, but will also provide important immunological data which may be applicable to the more complex case of infection with *W. bancrofti*.

" 8. From Fairley's results in *L. loa* and our own in guinea-worm disease it seems likely that the complement-fixation test by means of Dirofilaria extracts is a group reaction for the worms of the filarial family generally.

" 9. As the clinical manifestations of *W. bancrofti* infection are largely those of lymphatic obstruction whereby the antigenic factor is to a progressive extent cut off from the circulation, no serological test could be expected to diagnose all types and stages of the disease, but in a somewhat restricted field the test seems likely to be useful in diagnosis.

" 10. So far as examined, the specificity of the test seems quite satisfactory. Apart from guinea-worm disease, no positive reactions were obtained in other helminthic diseases, except in two cases of hookworm infection, in both of which *W. bancrofti* infection was also present.

" 11. As we have no method at present of combating the filarial toxin directly, the demonstration that some attacks of lymphangitis are of purely toxic origin is not of immediate therapeutic value, except in so far as it suggests that probably no benefit is to be looked for from vaccine treatment in this type of attack." *C. L.*

ASHFORD (B. K.) & SNYDER (H. McC.). **Gentian Violet in Filariasis.** —*Puerto Rico Jl. of Public Health & Trop. Med.* 1933. June. Vol. 8. No. 4. pp. 375–384. [Spanish version pp. 385–390.]

The authors' findings compared with those of Ashford in 1902–3 " bear out the frequently expressed opinion of medical men and lay men " that filariasis and elephantiasis have since then declined in frequency and severity in Porto Rico.

Treatment by gentian violet was given to 13 of 18 men found harbouring microfilariae, the other 5 serving as controls. The dosage was 0·065 gm. 3 times a day in enteric coated pills. The average number of red corpuscles of the 18 was 5,491,000 with variations between 4,016,000 and 8,784,000, and haemoglobin varied between 73 and 103. Microfilariae were counted between 8.30 and 9.30 p.m. for 7 nights before and 14 to 22 nights after treatment began. There was no disappearance of microfilariae from the blood but it may, it is believed, have caused a diminution in their numbers in 11 of the 13.

C. L.

MAYEOZOKO (S.). Ueber Fälle von geheilter Haematochylurie und Chylurie, sowie ueber kleine Experimente betreff der Widerstandsfähigkeit der Larven von *Filaria bancrofti* gegen Arzneimittel und Hitze. **[Resistance of Larvae of *F. bancrofti* to Drugs and to Heat.]**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1933. Mar. Vol. 32. No. 3 (336). [In Japanese. German summary p. 32.]

It is concluded in the German summary that antimonal, potassium picrate, quinine hydrochloride, trypaflavin, neoneoarsemin and potassium iodide damage microfilariae little, but that mixtures of them are most fatal. Heated to 40–43°C. larvae die in an hour, to 48°C. in 10 minutes.

C. L.

i. LOW (G. Carmichael) & MANSON-BAHR (P. H.). **Some Recent Observations on Filarial Periodicity. With a Clinical and Laboratory Report by** A. H. WALTERS.—*Lancet.* 1933. Mar. 4. pp. 466–468. With 5 figs.
ii. MURGATROYD (F.). **Filarial Periodicity.** [Correspondence.]—*Ibid.* 1933. Mar. 18. p. 610.
iii. LANE (Clayton). **Mechanical Basis of Periodicity in** *Wuchereria bancrofti* **Infection.**—*Ibid.* Aug. 19. pp. 399–404. [20 refs.]

Probably the best way of bringing order out of chaos and putting before readers the conflict of opinion relative to the vexed question of so-called filarial periodicity—really the periodicity of appearance of filarial embryos in the peripheral circulation—will be to deal with the above papers in order of their publication (see also this *Bulletin*, Vol. 26, p. 981).

i. In the first, Drs. Low and Manson-Bahr take for their text the case of an Indian steward under observation for 11 years at the Seamen's Hospital, Royal Albert Dock. Their main contention against Clayton LANE's theory of " periodic cyclic parturition " of the female filaria is that, with a daily destruction of all the embryos, absorption of so much dead material would produce considerable reaction in the human body, analogous to protein shock, which, in fact, does not occur. Logically, of course, this is a *non sequitur* ; it is no valid argument against cyclical parturition *per se* to say that destruction of the results of that parturition should produce certain symptoms.

Hourly examinations of the blood of the patient referred to above showed :—

> " (*a*) The periodicity curve is absolutely nocturnal but embryos are present in small numbers in the peripheral circulation during the daytime. This fact has often been noted before.
>
> " (*b*) The evening rise of the embryo filariae swarm is more gradual in character than the matutinal fall The maximum migration of embryos occurs at 2 a m.
>
> " (*c*) The number of embryo filariae and the character of the curve remains remarkably constant when taken on three distinct occasions, separated by a month or more of time—viz., June 4th, August 29th, and Sept. 2nd, 1932.
>
> " (*d*) The number of embryo filariae at the hour of midnight remains approximately the same in 1932 as it was in 1924, a period of eight years."

These facts, they maintain, support the idea that the sleeping and waking states are primary factors in the phenomenon of periodicity. It would indeed be of the greatest interest if similar tests were made on the non-periodic variety of the infestation in the Pacific, for, they say, " How can a daily cyclical destruction of embryos explain the phenomenon of non-periodic filaria ? " They believe that the embryos select the large vessels of the thorax as their city of refuge and that the outflow passes into the peripheral blood.

Blood was taken from the patient referred to and a quantity containing approximately 139,000 embryos injected into the heart of each of two guineapigs. There was no resulting distress, and no embryos were detected in repeated examinations of the peripheral blood. [The authors quote as a statement of Dr. Mortimer GRANVILLE one which he did not make. The statement really occurs in Sir Patrick MANSON's book on " the Filaria Sanguinis Hominis," 1883, p. 57, and is in reference to a letter from Dr. GRANVILLE which appeared in the *Lancet* the year before.]

ii. Dr. Murgatroyd in a letter referring to the above paper reports on the results, or absence of positive results, from injecting a man with citrated human blood containing 720,000 embryos. Four examinations of the peripheral blood in the succeeding 21 hours did not discover any embryos.

iii. Colonel Clayton Lane in his longer article takes the opportunity of the paper by Drs. LOW and MANSON-BAHR to put his points more fully. He quotes Sir Patrick MANSON to show that the latter, after deliberation, rejected the hypothesis of periodic parturition. F. W. O'CONNOR had found, from operations or autopsies on seven persons suffering from filariasis, that all the living female worms in the same body showed the same stage of the developmental cycle. Also that parturition took place about mid-day, the females being crammed with embryos before noon and collapsed and empty about 2 p.m. Now, if this daily birth of large numbers of embryos occurs and, as the paper above shows, the numbers in the peripheral blood are fairly stable, the number produced [not necessarily the *ones* produced] must be removed daily and destroyed.

O'CONNOR's studies showed that though there might be embryos in the afferent vessels and the peripheral parts of the lymphatic glands, he could see none in the efferent vessels. It is most improbable, therefore, that they habitually traverse the healthy glands. HANSCHELL'S experiments (injection into the guineapigs' hearts) and that of MURGATROYD (into the circulation of a volunteer) indicate that filarial embryos entering the blood stream are rapidly removed from it and do not return to it. How, or by what organ they are removed, has yet to be determined.

The objection that death of large numbers of embryos would produce symptoms (analogous, for example, to protein shock) Lane meets by saying that if a corresponding number of embryos were injected into a man of 60 kilos as was injected into the guineapigs, they would amount to 5 million embryos and 400 cc. of heterogenous blood ; nevertheless the animals showed no symptoms. Moreover, Lane has never maintained that there was daily cyclical destruction, but that the number produced at the daily cyclical parturition was removed (and destroyed) in the 24 hours, though this need not be completed even in that time. Against harbourage in the great vessels and lungs he remarks that the embryos are seen to drift on a slide with any little current and it is unreasonable to suppose that they could resist the torrent in the heart and aorta " being unceasingly buffeted by projectiles about as wide as their bodies." [Clayton Lane quotes the paragraph attributed by LOW and MANSON-BAHR to Mortimer GRANVILLE and assigns it rightly to MANSON, but gives as reference a letter from Sir Patrick in which this does not occur, instead of the book in which it does.]

He explains the lag of 12 hours or so between the parturition of the filaria and the appearance of embryos in the blood by a study of the changes found in the lymphatic system in filariasis. The afferent vessels to a gland are a favourite habitat of the worms and by endothelial proliferation these vessels become blocked. Details of some glands containing plasma cells (those with remains of embryos) and others with neither plasma cells nor embryos need not detain us ; the upshot is that filariae, adult and embryonic, stop the lymph flow which can be re-established only by canalization or collateral channel development. Sections seem to show that under obstructive pressure channels of capillary size are mechanically opened out in the walls of the lymph vessels ; these acquire an endothelium and anastomose and embryos may be forced into them. It is suggested that the slow drift through these tortuous by-paths accounts for the delay between mid-day parturition and mid-night appearance of embryos in the peripheral circulation. [One would think that the entrance would be more evenly distributed, rather than limited to a few hours of the night, but it may be that with the simultaneous parturition of all the females, all the embryos that do reach the blood have an equally difficult road to travel and arrive about the same time.]

What may be the nature of the stimulus to the rhythmical phenomenon of simultaneous and cyclical parturition has yet to be sought ; when this is discovered we may hope to find, by its absence or modification, the reason for the non-periodicity in the Pacific *W. bancrofti.*

H. H. S.

RAO (S. Sundar). **The Duration of the Life of the Embryos of** *Wuchereria bancrofti* **in the Human System.**—*Indian Med. Gaz.* 1933. Jan. Vol. 68. No. 1. pp. 3–6. With 3 figs. [13 refs.]

The life span of *Mf. bancrofti* outside and within the body is considered. At 4°C. and in aseptic conditions microfilariae were kept alive for 4 to 6 weeks. As regards their life in the host two cases are reported.

In one, in whom a cyst just below the elbow was excised, " embryos disappeared completely between the second and third month after the cyst was excised " and were still absent 2½ years later. In the second, repeated examinations of the blood showed no microfilariae but he had a cyst in each axilla and had actually been admitted to hospital for scrotal lymphangitis followed by abscess. The cysts which contained on puncture a few microfilariae were removed under local anaesthesia, one on 22nd July, the second on 4th August. On the latter date microfilariae were first found in the blood. Finger blood (100 cmm.) was taken daily at midnight for 68 days from 6th August. Counts varied from 4 to 0, the latter on 37 of the 68 days. They were not found for 37 days after 12th October. " In both cases there is definite evidence of the cyst being the location of the adult worms and the sole source of embryos in the blood." So, confident in this last conclusion, for which evidence is not, nor without minute post-mortem examination could be, offered, it is inferred that the duration of life of embryos in the human body is about 70 days.

C. L.

ROMITI (Cesare). Contributo alla migliore conoscenza del ciclo biologico della " Filaria Bancrofti Cobb." nell'uomo. (Nota preliminare.) [**The Biological Cycle of** *F. bancrofti* **in Man.**]—Reprinted from *Monitore Zoologico Italiano.* 1932. Vol. 43. No. 6. pp. 167–170. With 1 fig.

Romiti makes these confident statements regarding persons who have *Mf. bancrofti* in the blood. (1) When the spermatic cord on one side is extirpated there is a marked diminution at the end of the first week of the number of microfilariae circulating in night blood. (2) When both cords are removed all microfilariae disappear from the blood within two weeks. He concludes that the cord is the habitat of the fertile adults in most cases, and that the life of microfilariae is relatively short. *C. L.*

MACKERRAS (I. M.). **Metamorphosis of *Filaria bancrofti* Cobbold.** [Correspondence.]—*Brit. Med. Jl.* 1933. July 1. p. 36.

A question of priority is felt to be at issue here.

MANSON-BAHR has written "The actual time-cycle development of the filaria in the mosquito was worked out first by Dr. Carmichael Low in 1900 on material sent to Manson by Thomas Bancroft" [*Brit. Med. Jl.*, 1933, Vol. 1, p. 304]. Mackerras points out that what delayed discovery of the full cycle in the mosquito by MANSON, LEWIS and others was the conviction that mosquitoes fed once only, and having laid their eggs died. BANCROFT & ROSS realized independently that this was untrue, and the former wrote "It never dawned on me that my mosquitoes were dying from starvation." As soon as Bancroft discovered how to keep them alive for considerable periods, the rest of the work was comparatively simple, and at a meeting of the Royal Society of New South Wales on June 7th, 1889, he described and figured the various stages of larval development in the mosquito, giving the time of development as 16 to 35 days, according to season, and writing in an addendum :—

> "It has occurred to me that the young filariae may gain entrance to the human host whilst mosquitos bearing them are in the act of biting. The entrance of warm blood into the mosquito may excite the young larvae, in consequence of which they . . . pass down the proboscis into the human skin."

C. L.

ROMITI (Cesare). **Report and Considerations on the Cystoscopic Examination and Ureteral Catheterisation in Four Cases of Chyluria, Observed in British Guiana.**—*Brit. Guiana Med. Ann. for 1932.* pp. 74–83.

These four cases were women and are the only cases of chyluria seen by Romiti in British Guiana during 8 years, in which time he has performed 843 operations on men for filarial manifestations.

In all 4 cases there was cystoscopy and ureteral catheterization. In one there was no history or sign of filariasis, but chyluria had persisted interruptedly for 20, continuously for 10, years ; urine from the ureters was clear, chyle came from dilated mucosal lymphatics spread over an area about 3 cm. in diameter in the bladder immediately above the opening of the left ureter. In a second case with like bladder lesions and clear ureteral urine there was proved filariasis (microfilariae, which were found in no other case, and waxed kernels as enlarged femoral glands are locally called, fever, "rose," and elephantiasis subsiding with rest). In the other two cases the chyle came from one ureter only and the quantity of fluid from the affected side was 2 to 4 times as great as from the healthy. In 2 cases laparotomy for other reasons revealed dilation of the uterine and utero-ovarian lymphatic plexus and of none other, and all the cases suggest that the dilatation of the lymphatic vessels which causes the condition may occur over a very limited area only. *C. L.*

McCOY (O. R.). **The Occurrence of *Microfilaria ozzardi* in Panama.**—*Amer. Jl. Trop. Med.* 1933. May. Vol. 13. No. 3. pp. 297–310. With 1 fig. & 4 plates. [12 refs.]

"1. *Microfilaria ozzardi* was found in the blood of 44·5 per cent. of 119 Indians examined in the Tuira River basin, Darien Province, Panama.

"2. The infection rate in native villages in the same region varied from 2 to 57 per cent. and averaged 9·9 per cent. in the 244 natives examined.

"3. A few cases of infection with *M. ozzardi* were found in the Chagres River valley, Panama, but all of these were recent arrivals from the Atrato River valley, Colombia.

"4. No evidence was found that *M. ozzardi* is pathogenic or in any way a significant problem of public health importance.

"5. Southeastern Panama is an endemic center of infection with *M. ozzardi* heretofore unknown in the geographical distribution of the parasite." *C. L.*

CHAMBON Présence de microfilaires dans le liquide céphalo-rachidien d'un trypanosomé avancé [**Microfilariae in the Cerebrospinal Fluid of a Patient with Advanced Trypanosomiasis.**]—*Bull Soc Path Exot.* 1933 Apr 5 Vol 26 No 4 pp 613–614

In a man suffering from sleeping sickness, lumbar puncture revealed active *Mf perstans* in the withdrawn fluid Red corpuscles were so few that it is concluded that they had come from the cerebrospinal fluid itself, presumably as the result of damage inflicted on the meninges by trypanosomes *C I*

GREIG (E. D. W). **Notes on Cases of Calabar Swellings** (*Loa loa* **Infection).**—*Jl. Trop. Med. & Hyg.* 1933. June 15 Vol. 36. No. 12. pp. 169–170.

Greig reports 7 cases of Calabar swelling. Naturally they do not lend themselves to abstraction. Some interesting points are mentioned.

In one, eosinophilia varied between 5·2 and 46 during 4 months' observation In another, the woman said she could see the worm or part of it in her eye, but nothing was present in the visible part of the eye on dilatation with cocaine and homatropine. In a third, a doctor at Dagema failed to extract a loa but thought he had killed it. A cyst formed at the spot adherent to the outer and lower quadrant of the right sclerotic and illumination showed a coiled slender white thread which excision of the cyst showed to be a nematode In a fourth, appearance of any Calabar swelling was preceded 10 to 24 hours earlier by pricking in the skin, insistent enough to prevent sleep. Two complement-fixations were carried out by Hamilton FAIRLEY, one positive one negative, the unusual feature of the latter being that microfilariae were present in the blood *C. L.*

VAN SLYPE (W) Essai de chrysothérapie des filarioses Effet eutrophique de l'or [**Gold Therapy in Filariasis.**]—*Ann. Soc. Belge de Méd. Trop* 1933 Mar 31. Vol. 13 No 1. pp. 87–91.

On 6 persons infected with *Dipetalonema perstans* or *Loa loa*, alone or combined, van Slype has tested two gold-containing organic compounds—solganal intravenously or solganal B intramuscularly—following these up with fuadine intramuscularly No permanent vermicidal action was evident.

In all cases there was great diminution or even complete disappearance of microfilariae from the blood, and in this connexion great stress is laid on the method of examination, for thin or thick films may show no embryos when triple centrifuging displays them, but in all cases microfilariae reappeared in full activity after treatment ceased. Yet there was in general an improvement in numbers of red corpuscles and in weight, which it was felt could not be explained by hospital feeding. *C. L.*

GOUGEROT & BLUM (Paul). Un cas de "filaria loa" guéri par des injections sous-cutanées de sulfarsénol. [**Case of Loa Infection which recovered after Injections of Sulfarsenol.**]—*Bull. Soc. Française Dermat. et Syph.* 1932. Jan. Vol. 39. No. 1. pp. 154–155.

After pointing out the varying results which have followed arsenical treatment of filariases, the authors recount a case of cure.

A forester, 40 years old, was incapacitated from work by Calabar swellings and painful tumours of 10 months' duration. After two treatments with sulpharsenol, the first totalling 0·48 gm., the second 1·08 gm., oedema and cysts completely disappeared, and cure persisted 6 months later. *C. L.*

GALLIARD (H.). L'éosinophilie sanguine au cours des filarioses chez les indigènes du Gabon. [**Eosinophilia in Filariasis in Natives of Gabun.**]—*Le Sang.* 1933. Vol. 7. No. 7. pp. 711–715.

There is a certain parallelism between eosinophilia in the native inhabitants and the average degree of infection with loa (see Table); although the confusing presence of hookworms is noted, and individual differences may be great.

	Percentages of		
	Mf. perstans	*Mf. loa*	Eosinophilia
Children to 5	10	0	11
„ 5 to 15	51	5·7	31
Adults	47·5	15·4	48
Aged	20	0	30

Eosinophilia is more closely connected with intensity of clinical signs than with presence of microfilariae, though the highest number of eosinophils occurred in one who had never suffered from symptoms, and though their numbers may vary greatly in persons placed in apparently identical conditions of likelihood of infection. *C. L.*

NEUMANN (Hans). Ein Fall von Gelenkerkrankung (Coxitis rechts) bei *Filaria loa.* [**Hip Joint Affection in a Case of Loiasis.**]—*Deut. Ztschr. Chir.* 1932. Vol. 237. No. 4–5–6. pp. 331–342. [19 refs.]

A man of 28 was in the Cameroons from 1912 to 1916 and there suffered from malaria, blackwater fever twice, beriberi, gonorrhoea and filariasis as evidenced by Calabar swellings and appearance of Loa in the eyelids. Wassermann positive, Tuberculin tests negative. Eosinophilia up to 20 per cent. An abscess pointed beside the spermatic cord, and the hip joint was found to be involved. A worm crossed the lid, was extracted and proved to be a Loa. Six days later one crossed the popliteal space, and *Mf. loa* was then found in the blood, apparently for the first time. Drug treatment consisted in 36 very painful intramuscular injections of solution of "20 thymol + 20 oleum olivarum." The abscess closed and microfilaria were no longer found in the blood. *C. L.*

HISSETTE (J.). Mémoire sur l'*Onchocerca volvulus* "Leuckart" et ses manifestations oculaires au Congo Belge. [**Onchocerciasis and its Ocular Manifestations in Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1932. Dec. 30. Vol. 12. No. 4. pp. 433–529. With 29 figs. [7 pages of refs.]

This long, detailed and important paper appears definitely to eliminate *O. caecutiens* as an entity different from *O. volvulus.*

It is pointed out that anatomical differences between the two forms are so slight that they are in fact indistinguishable. In certain regions in the Belgian Congo where onchocerciasis was formerly unknown it is now rampant, with grave ocular complications in as many as 50 per cent. of the population; and the clinical symptoms of these, the pathological lesions and the distribution of microfilariae in the eye are just those which have been reported for "*O. caecutiens.*" A very grave view is taken of the ocular complications, it being held that there is a slow, inexorable progress towards blindness; they are not necessarily associated with nodules on the head. Thus a Table of 20 cases is given, all with ocular symptoms, all positive to the diagnostic technique the writer advises (namely the teasing out in normal saline of a fragment of snipped-off bulbar conjunctiva, which in fact showed microfilariae varying in number from 1 to 32), and none with nodules on the head but with 2 to 23 on shoulders and chest. In treatment excision of obvious cysts leaves behind those more deeply situated and has not checked the trouble. Drug treatment is being investigated.

In prophylaxis the recommendation is a completely forest-clear space round villages of 500 metres and the covering up of the body when working in spots where simulium prevails, of whose connexion with the illness the indigenes are themselves convinced. The photographs illustrate microfilariae in choroid, ciliary body, iris, sclerotic, episclera and conjunctiva and the lesions they produce in them; as well as men blinded and partially blinded individually and in mass, and nodules and lesions in the skin. *C. L.*

JOHNSTONE (Herbert G.) & LARSEN (Albert E.). **Onchocercosis in North America.**—*California & Western Med.* 1933. May. Vol. 38. No. 5. pp. 361–364. With 3 figs.

"This disease may seem a medical curiosity to physicians of the temperate zone since it has no immediate attendant public health problems, but we should become acquainted with it for the following reasons: (1) Clinical manifestations of Onchocercosis resemble many conditions of the temperate zone. (2) The Eusimulium fly is widespread in certain localities throughout the western States. (3) The disease has shown a definite tendency toward a northern migration. (4) The numerous Mexican immigrants in the United States provide an opportunity for the presence of a carrier of *Onchocerca caecutiens.*

This may lead subsequently to the contamination of our own simuliid species. If this occurs, a case of the disease is sure to make its appearance sooner or later; and, once present, it is difficult to eradicate."

C. L.

Bauvallet (H.). A propos de la dracunculose chez les noirs d'Afrique. [**Dracunculosis in African Natives.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 444–446.

The loss of working efficiency induced by dracunculosis in French West Africa is indicated by the fact that 7 per cent. of recruits are immobilized by it, the average duration of treatment being 23 days, with limits of 73 and 11. If compactly and conveniently coiled, worms may with advantage be excised. In one case 7 worms were removed from the lower limbs and one from the thoracic wall within 4 months.

C. L.

Morard Au sujet de la draconculose à Bilma [**Dracunculosis at Bilma, Niger Colony.**]—*Bull. Soc Path Exot.* 1933. Mar. 8. Vol 26. No. 3. pp. 535–536.

Although imported wholesale into Bilma in the Niger Colony dracunculosis is not endemic there. *C. L.*

Chitwood (B. G.). **Does the Guinea-Worm occur in North America?**—*Jl. Amer. Med. Assoc.* 1933. Mar. 18. Vol. 100. No. 11. pp. 802–804. [14 refs.]

The answer is "Yes" for animals, "No" for man. For animals apart from Benbrook's find in the silver fox in Iowa, Chitwood has found the worm in the raccoon (*Procyon lotor*) from Ontario and New York and in the mink (*Putorius vison*) from Nebraska, 4 cases in all. Of the 10 cases reported from man, four are genuine and must from their histories have been contracted elsewhere. Of the other 6 cases, Barkan's (1876) was probably Loa, and Jarvis's (1857) probably a foreign body, Walker's (1857) and Vanharlingen's probably creeping eruption, Leidy's (1850–51*bis*) *Filaria hominis-oris* probably gongylonema and not the male of *D. medinensis* as Leidy alternatively suggested. The freedom of man from infection in North America is attributed to his habits there. *C. L.*

Benbrook (E. A.). *Dracunculus medinensis* **(Linnaeus, 1758) appears in the United States as a Parasite of the Fox.**—*Jl. Amer. Vet. Med. Assoc.* 1932. Dec. Vol. 81. No. 6. pp. 821-824. With 2 figs.

Identification was by B. G. Chitwood of the Bureau of Animal Industry, U.S. Department of Agriculture and is substantiated by photographs. The worms occurred in a year-old silver-black vixen (*Vulpes fulva*) whelped and raised on a farm, the fox pens on gravelly soil being floored with sand, and with no water except raised drinking pans. The food was meat scraps with occasional vegetables, bananas and other fruit. None of the other foxes was affected. *C. L.*

HOFFMAN (W. A.). **Gapeworm Infestation of Man.**—*Bol. Asoc. Med. de Puerto Rico.* 1932. Dec. Vol. 24. No. 207. pp. 703–704.

Within 18 months Hoffman [this *Bulletin*, Vol. 29, p. 72] has added to the record another case of infection with *Syngamus laryngeus* in man.

This woman teacher had been so affected with cough and fever as to have her work interfered with. Study by GUTIERREZ-IGARAVIDEZ showed that she had bronchiectasis, but tuberculosis was held to be excluded. She finally expelled a pair of worms with bloody mucus during a violent fit of coughing. Although there were minor morphological differences SCHWARTZ confirmed the identification. *C. L.*

PROMMAS (Chalerm) & DAENGSVANG (Svasti). **Preliminary Report of a Study on the Life-Cycle of** *Gnathostoma spinigerum*.—*Jl. Parasitology.* 1933. June. Vol. 19. No. 4. pp. 287–292. With 4 figs. [12 refs.]

In Cyclops, hatched larvae of *G. spinigerum* undergo development to a stage possessing the essential distinctive anatomical features of the adult.

Eggs were separated from faeces by McCOY's method (this *Bulletin*, Vol. 27, p. 426). After lying in water from 10 to 20 days active loosely sheathed embryos hatched, but died if left in water. Fed to white rats and to larvae of *Ctenocephalus canis* and *C. felis* no development occurred. When placed in water with cyclops specimens, which random sampling showed to be free from helminthic infection, they were swallowed, pierced the gastric wall and developed in the body cavity reaching in 14 days 0·372 mm. long by 0·062 mm. wide. They had by then a cephalic bulb with 2 lips and 4 rows of pointed spines, oesophagus and intestine, a set of cells in the middle third which is probably a germinal body and 4 transparent contractile cervical sacs "connected with the mouth." The larva then becomes motionless save for slight movement of the head, but is stimulated *in vitro* by 0·4 per cent. hydrochloric acid. Experiments regarding transmission to the definitive host will be undertaken. *C. L.*

STRICKLAND (C.) & ROY (D. N.). **The Rôle of Chaetopods (Segmented Worms) in their Relation to Man.**—*Indian Med. Gaz.* 1933. Mar. Vol. 68. No. 3. pp. 159–160.

"We may conclude by asserting the vastly greater importance of these worms to man from the economic point of view rather than the medical. The comparatively few medical cases that have been reported may be grouped into two classes, firstly those of interest to the psychiatrist, and secondly those to the surgeon or gynaecologist, these being probably all due to contamination of the water in the use of man, the worms adapting themselves to such diverse situations as the vagina, nasopharynx and intestine." *C. L.*

AMELIO (Fortunato). Contributo di osservazioni cliniche, per una più esatta conoscenza del tipo di anemia degli individui affetti da anchilostomiasi.—*Giorn. Ital. di Malat. Esot. e Trop.* 1933. Mar. 31 Vol 6. No. 3. pp. 57–60, 63–6, 69–72.

Anderson (T. Farnworth). A Case of Acute Intestinal Obstruction due to Ascaris.—*East African Med. Jl.* 1933. Mar. Vol. 9. No. 12. p. 367.

Bacigalupo (J.). Superposition géographique de *Fasciola hepatica* L. et de *Limnaea viatrix* d'Orb.—*C. R. Soc. Biol.* 1933. Feb. 10. Vol. 112. No. 5. pp. 492–493.

Beijnen (G. I. W. Koolemans). Een gecombineerde worminfectie van den darm.—*Nederl. Tijdschr. v. Geneesk.* 1933. June 3. Vol. 77. No. 22. pp. 2477–2485.

Bhalerao (G. D.). A Note on the Probability of Infection of Man and Domestic Carnivores by *Isoparorchis hypselobagri* (Billet, 1898).—*Indian Jl. Vet. Sci. & Animal Husbandry.* 1932. Dec. Vol. 2. Pt. 4. pp. 406–407. With 1 fig.

Brünauer (Stefan R.). *Trichocephalus dispar* und Neurodermitis.—*Wien. Klin. Woch.* 1933. June 30. Vol. 46. No 26. pp. 812–814. With 1 fig. [17 refs.]

de Buen (Eliseo), De la Camara (Pedro) & Juarez (Ernesto). Estudio de un foco de anquilostomiasis en un tejar del término municipal de Oropesa (Toledo).—*Rev. San e Hig. Pública.* 1932. Nov. Vol. 7. No. 11. pp. 1062–1083. With 2 figs. [32 refs.]

Cawston (F. G.). The Frequency of Liver Changes in Schistosomiasis.—*Jl. Trop. Med. & Hyg.* 1933. Apr. 1. Vol. 36. No. 7. pp. 98–99.

Cruz (Walter Oswaldo). Therapeutica da ankylostomose.—*Hospital.* Rio de Janeiro. 1933. June. Vol 5 No. 6 pp. 471–476. With 4 figs.

De la Cámara (Pedro) & Acosta Camps (Leopoldo). Una encuesta epidemiológica sobre anquilostomiasis en tejares de las provincias de Cáceres y Toledo.—*Rev. San e Hig. Pública.* 1932 Dec. Vol. 7. No. 12. pp. 1161–1170

Emanuel (J). Iets over bilharzia op de Boven-windsche eilanden (West-Indie) —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Feb. 28. Vol. 73. No 5. pp. 286–288 With 1 plate.

Giunta (Giuseppe). Profilassi contro l'uncinariasi in Somalia.—*Ann. di Med. Nav. e Colon.* 1933. Mar.-Apr. 39th Year. Vol. 1. No. 3–4. pp. 174–182.

Khouri (Joseph). Contribution à l'étude de la toxémie hépatorénale dans la bilharziose chronique.—*Premier Congrés Internat. d'Hyg. Méditerranéenne, Marseille, 20–25 Septembre 1932.* 3 pp. [10 refs.]

Knott (James I.) & Rice (Justus B). Elephantiasis of the Scrotum. Operative Technique.—Reprinted from *Amer. Jl. Surgery.* 1932. Apr. N.S. Vol. 16. No. 1. pp. 78–80. With 5 figs.

Lüdtke (H.) Vergleichende Untersuchungen ueber das Ol Chenopodii und sein wirksames Prinzip, das Askaridol.—*Med. Klin.* 1933. Apr. 28. Vol. 29. No. 18 (1481). pp. 611–613.

Martinez González (M.). La anquilostomiasis en las minas de Puertollano —*Rev. San. e Hig. Pública.* 1933. Jan. Vol. 8. No. 1. pp. 23–48. With 9 figs.

Niño (Flavio L.) & Defazio (Francisco). La cuestión de las apendicitis verminosas.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1932. Vol. 8. No. 67. pp. 119–135. With 10 figs. [20 refs.]

Niño (Flavio L.) & Defazio (Francisco). La cuestión de las apendicitis verminosas.—*Semana Méd.* 1933. Apr. 6. Vol. 40. No. 14 (2047). pp. 1166–1176. With 10 figs. [20 refs.]

Policaro (R. D.). Sopra un caso di bilharziosi vescicale.—*Riforma Med.* 1933. Mar. 25. Vol. 49. No. 12. pp. 439–442. With 1 fig.

Romero Calatayud (Antonio). El parasitismo intestinal por vermes en sus relaciones con la infeccion tuberculosa.—*Medicina Países Cálidos.* Madrid. 1933. Jan. & Mar. Vol. 6. Nos. 1 & 2. pp. 27–50; 104–132. [56 refs.]

Smorodinzew (I. A.), Bebeschin (K. W.) & Pawlowa (P. I.). Beiträge zur Chemie der Helminthen. I. Mitteilung: Die chemische Zusammensetzung von *Taenia saginata.*—*Biochem. Ztschr.* 1933. May 20. Vol. 261. No. 1–3. pp. 176–178.

Suárez (Jenaro). Elephantiasis Tropicum.—*Puerto Rico Jl. of Public Health & Trop. Med.* 1933. Mar. Vol. 8. No. 3. pp. 287–292. With 4 figs. (3 on 2 plates). [Spanish version pp. 293–298.]

Tareeff (E.), Osherova (F.) & Raskin (A.). [Clinical Aspects of Trichinellosis.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1932. Vol. 1. No. 1. pp. 45–49. [In Russian.]

Timpano (P.). Di alcune rare complicazioni dell'anchilostomiasi.—*Policlinico.* Sez. Prat. 1933. May 22. Vol. 40. No. 21. pp. 818–820.

Ujlaki (P.). Een geval van Askariden-asthma met Colica mucosa.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. June 6. Vol. 73. No. 12. pp. 758–760.

Vattuone (A. B.). A New Intradermal Reaction in Ankylostomiasis.—*Med. Jl. Australia.* 1933. May 27. 20th Year. Vol. 1. No. 21. pp. 645–647.

Walthard (B.). Zur Lehre der Askarideninfektion im Säuglings- und Kindesalter.—*Schweiz. Med. Woch.* 1933. May 6. No. 18. pp. 420–424. [11 refs.]

YELLOW FEVER.

LLOYD (Wray) & PENNA (H. A.). **The Preservation of Yellow Fever Immune Sera.**—*Amer. Jl. Trop. Med.* 1933. May. Vol. 13. No. 3. pp. 291–295.

Yellow fever immune serum was dried by collecting it in suitable tubes or containers and then freezing it in a mixture of 95 per cent. alcohol and carbon dioxide snow.

The tubes are rotated whilst the serum is freezing so that a thin layer of the frozen serum is formed inside. The tubes are then placed inside a sulphuric acid desiccator, packed in salt ice for at least two hours before use, and the air exhausted from the desiccator by means of a high vacuum pump. The tubes are removed after 24 hours and sealed, when the pale yellow serum will be found to be easily converted into a fine powder by a little shaking. When needed for use the ampoule is opened and sufficient distilled water added to make up the volume lost by desiccation. A series of titrations in mice with three samples of immune sera, both fresh and desiccated, shows that there was no appreciable reduction in the " immune protecting antibody " content of dried sera after storage at refrigerator temperatures for a period of five months. *E. Hindle.*

THEILER (Max). **A Yellow Fever Protection Test in Mice by Intracerebral Injection.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 57–77.

The author has elaborated a simple intracerebral test in mice for determining quantitatively the amount of protective antibodies in yellow fever immune serum.

The serum under investigation was mixed with an equal volume of a 1/10,000 dilution of mouse brain virus, and 0·03 cc. amounts were injected intracerebrally into six mice. All of six sera from persons who had been infected with yellow fever 53 or more years before bleeding showed definite protection. The virus suspension was prepared by grinding up an infected mouse brain with saline or distilled water containing 10 per cent. human or monkey serum. The mixture was then centrifuged at 2,500 revolutions a minute for half an hour and the supernatant fluid used for the tests. This fluid contained from 100,000 to more than 2,000,000 minimum lethal doses per cc. When this test was repeated using a 1/1,000 dilution of virus and serum in three concentrations, undiluted, 1/10 and 1/100, there was a falling off in the number of mice surviving when the 1/100 dilution of serum was used and in some instances even with the 1/10 dilution.

Experiments with filtered frozen and dried virus preparations were then made and it was found that the minimum lethal dose of these preparations varied very considerably, for in one the concentration fell from 1/20,000 and 1/200,000 to 1/800 after 389 days, whilst in another the end point started at 1/40,000 to 1/160,000 and after 394 days storage was 1/20,000. The author confirms SAWYER & LLOYD's observation [see this *Bulletin*, Vol. 29, p. 198] that different strains of mice show various degrees of susceptibility to yellow fever virus. Four strains of mice were injected with various dilutions of the virus and the percentages of mice which died were respectively 24·5, 63·0, 62·4 and 66·7 per cent. Age and diet were found to have no effect on this susceptibility.

It is shown that when each mouse received 32 minimum lethal doses in 0·03 cc. amounts, out of 120 control mice only 2 were alive 10 days after inoculation, whilst in a series of protection experiments in which the virus was mixed with immune sera, in every case all, or all but one, of 6 mice inoculated were alive on the tenth day. For accurate work it is recommended that 12 mice should be used for each test. The limitations in the methods of preserving virus render the use of frozen material unsuitable for the routine testing of sera by this method.

The great importance of the diluent is emphasized for, as is well known, the virus deteriorates rapidly in normal saline. Although the addition of 10 per cent. serum prevents this, different sera vary considerably in their suitability for use in this capacity. Many ascitic and pleuritic fluids were found to be quite satisfactory as diluents, also a 2·5 per cent. solution of egg albumen in distilled water.

E. H.

LAIGRET (J.). Recherches expérimentales sur la fièvre jaune. (Deuxième mémoire.) I.—Réactions observées chez l'homme, consécutivement à l'inoculation du virus de souris. II.—Atténuation de ce virus par vieillissement à la température ordinaire ; conservation du virus atténué. [**Experimental Studies on Yellow Fever. I. Reactions in Man following Inoculation of Mouse Virus. II. Attenuation of Virus with Age ; Preservation of Attenuated Virus.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 412–430. With 3 charts.

i. Seven subjects were inoculated with 1 cc. of a 1/10,000 suspension of mouse brain infected with neurotropic yellow fever virus after 143 passages in mice, and three of them showed marked reactions after an incubation period of 13 to 15 days. In one, only febrile symptoms developed ; but in the other two, there was a slight albuminuria, jaundice, marked nervous symptoms, and haemorrhagic expectorations. The blood of these subjects collected during the febrile period was inoculated into a rhesus monkey, and also into guineapigs, and intracerebrally into mice with uniformly negative results. Uncertain results were obtained in rats, mice, and guineapigs with the haemorrhagic sputum. In addition, the cerebrospinal fluid of two of the patients was inoculated into mice without any effect. The protective power of the serum of all seven against yellow fever was found to be very slow in developing, being either feeble or absent on the 13th day, but all were protective on the 29th to 32nd days. In discussing this problem the author considers that the virulence of the virus is not absolutely fixed in mice, and has augmented in the course of successive passages, for the results obtained previously in the vaccination of human cases with a virus, after slightly fewer passages in mice, differ from the results of the present series [see this *Bulletin*, Vol. 29, p. 572].

ii. It is found that the brains of mice infected with yellow fever if kept at 10–20°C. gradually lose their virulence in the same way as spinal cords infected with rabies exposed to desiccation. The virulence had generally disappeared after 3 to 5 days at ordinary temperatures but at any stage the loss in virulence could be arrested by freezing the infected brain material, preferably in the form of a glycerin suspension. The inoculation of such attenuated virus into mice caused the development of immunity without any signs of infection.

[These results suggest that the use of neurotropic mouse virus for vaccination is not entirely without risk.] *E. H.*

LAIGRET (J.). La vaccination contre la fièvre jaune. [**Vaccination against Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26 No. 6. pp. 806–814.

A general discussion of the subject, with special reference to the use of neurotropic mouse virus without immune serum. *E. H.*

STEFANOPOULO (Georges J.). Vaccination antiamaril. [**Vaccination against Yellow Fever.**]—*Presse Méd.* 1933. June 24. Vol. 41. No. 50. pp. 1016–1017.

A good general account of the subject with special reference to the author's use of horse yellow fever antiserum for the neutralization of neurotropic mouse virus.

It is found that horse antiserum can be substituted for human convalescent serum in the proportion of 1 : 5 in the method of vaccination elaborated by SAWYER, KITCHEN & LLOYD, in which the injection of a mixture of neurotropic mouse virus and human immune serum is accompanied by separate injections of additional human serum to make up the amount required for protection. This result overcomes the objection to the general use of this method for the vaccination of human subjects, since there were great difficulties in obtaining sufficient quantities of human convalescent serum. *E. H.*

ARAGÃO (Henrique de Beaurepaire). Emploi de virus vivant dans la vaccination contre la fièvre jaune. [**The Use of Living Virus in Vaccination against Yellow Fever.**]—*C. R. Soc. Biol.* 1933. Apr. 27. Vol. 112. No. 14. pp. 1471–1473.

The author recalls his earlier work showing that it was necessary to use living virus in order to obtain a good vaccination against yellow fever. Details are given of five human cases vaccinated with neurotropic mouse virus and immune serum.

One of these subjects showed a slight rise in temperature accompanied by malaise on the 7th and 8th days ; and the blood contained yellow fever virus which was passaged in mice. The reinoculation of virus increased the protective value of the serum threefold in the case of one person and was not followed by any reaction. Using a neurotropic virus after 200 passages in mice, two rhesus monkeys were infected by inoculation and both died of the disease. Their blood was infective to mice and also to mosquitoes. Some of these insects, 10 days after feeding on these monkeys, were ground up and inoculated into a normal rhesus, which died with typical lesions of yellow fever. Consequently the author is opposed to the use of virus alone for vaccination, but recommends that a preliminary injection of 3 cc. of human immune serum should be given, followed 6 hours later by the inoculation of a mixture of 2 cc. of immune serum and 0·001 gm. of mouse brain virus. [The amount of immune serum used by the author, a total of 5 cc., is far below the quantity recommended by SAWYER, KITCHEN & LLOYD—0·3 cc. to 0·5 cc. per kilo body weight. It is evident that the smaller doses of immune serum are insufficient to ensure the absence of virus from the circulation.]

E. H.

Findlay (G. M.). Sur l'immunisation contre la fièvre jaune. [**Immunization against Yellow Fever.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 1009–1014.

The author has vaccinated 25 persons against yellow fever, using the method elaborated by Sawyer, Kitchen & Lloyd. The immune serum was obtained either from recovered cases of the disease or from recently vaccinated subjects. Wassermann tests were made on all sera and in addition protection tests in mice, no serum being used with an antibody titre of less than 1 : 256. Before use the sera were passed through a Seitz filter and received the addition of 0·2 per cent. tricresol dissolved in ether. All sera were tested for sterility by aerobic and anaerobic culture for one week at 37°C.

With immune serum of titres from 1 : 256 to 1 : 512 a dose of 0·5 cc. per kilo body weight was used, but with more active sera the dose was reduced to 0·3 cc. per kilo. The serum was inoculated subcutaneously into three or four places in the abdomen, and 4 to 6 hours later the vaccine was inoculated subcutaneously into the arm. The vaccine was prepared in the usual manner by drying a mixture of infected mouse brain and human immune serum, and dissolving it in distilled water before use.

The injections were usually followed by a general reaction 28 to 34 hours later, of the 25 cases 20 showed more or less fever, and in 5 the temperature was above 39°C. Common symptoms were headache, generally frontal or post-orbital, and most patients had a sensation of chilliness.

One patient, whose symptoms are described in detail, showed a much more severe reaction, including the appearance of red cells in the urine. It is difficult to explain the symptoms of this case, for no yellow fever virus could be found in the circulation, and later there was a satisfactory titre of immune bodies. In 3 cases examined for immunity on the 10th day after vaccination the titre was 1 : 8, whilst in 14 cases examined after 2 to 4 weeks the titre ranged from 1 : 128 to 1 : 512. The sera of 4 subjects 5 to 7 months after vaccination showed titres of 1 : 128 to 1 : 512.

In order to reduce the amount of immune serum necessary for protection the author has made experiments with monkeys and finds that the intradermal inoculation of 1 cc. of immune serum followed one hour later by an intradermal injection of virus in the same region, is followed by the development of a high degree of immunity without the appearance of virus in the blood. In collaboration with Dr. J. C. Broom efforts are being made to obtain the virus free from foreign proteins by the use of graded collodion filters. *E. H.*

Paris Eguilaz (H.). El peligro de la fiebre amarilla en los territorios españoles del Golfo de Guinea. [**Risk of Yellow Fever in the Spanish Territories of the Gulf of Guinea.**]—*Medicina Países Cálidos.* Madrid. 1933. May. Vol. 6. No. 3. pp. 196–201. [11 refs.]

——. La fiebre amarilla en Fernando Póo.—*Rev. San. e Hig. Pública.* 1933. July. Vol. 8. No. 7. pp. 72–75.

The author discusses in somewhat general terms the application of tests for determining endemic regions of yellow fever, by taking samples of blood of the inhabitants, especially of children under 10 years of age, if there is grave suspicion that the disease exists in the area in question, and injecting the serum with virus intracerebrally into mice. He then proceeds to consider reasons for applying these tests in Fernando Po.

He states that during 1931 several suspicious cases were observed and Fernando Po is exceptionally liable to importation of the virus by both sea and land routes, vigilance being particularly called for on the north and east. "The diffusion of Aedes mosquitoes and the facility with which the virus can be imported from neighbouring territories where yellow fever is endemic constitute a real danger of outbreaks in Fernando Po." *H. H. S.*

LLOYD (Wray) & PENNA (H. A.). **Yellow Fever Virus Encephalitis in South American Monkeys.**—*Amer. Jl. Trop. Med.* 1933. May. Vol. 13. No. 3. pp. 243–264. With 2 figs. [13 refs.]

Neurotropic yellow fever virus contained in Berkefeld N filtrates of infectious brain material was inoculated intracerebrally into various species of South American monkeys. A typical encephalitis was produced in *Saimiri sciureus*, *Ateleus paniscus* and *A. variegatus*, *Cebus frontatus*, *Callithrix albicollis* and *Callithrix* sp. and in these species the virus could be maintained by intracerebral inoculation for a number of passages and also transferred back to mice. In the case of *Leontocebus ursulus* intracerebral inoculation was followed in some instances by a febrile reaction with neurological symptoms and death, but no success was obtained in a limited attempt to transfer the virus in series in this species. *E. H.*

STEFANOPOULO (G.) & WASSERMANN (R.). Sensibilité du cobaye au virus neurotrope de la fièvre jaune [**The Susceptibility of the Guineapig to Neurotropic Yellow Fever Virus.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 557–559.

Guineapigs inoculated intracerebrally with a neurotropic virus after 174 passages in mice, succumbed to a myelo-encephalitis after 6 to 13 days. The infection was transmitted for three passages in guineapigs and at the second passage mice were also infected in order to prove the nature of the disease. These results clearly indicate the susceptibility of guineapigs to this method of infection.* *E. H.*

COWDRY (E. V.). **The Microincineration of Intranuclear Inclusions in Yellow Fever.**—*Amer. Jl. Path.* 1933. Mar. Vol. 9. No. 2. pp. 149–164. With 2 plates. [24 refs.]

The method of microincineration consists of incinerating microscopic sections after suitable fixation, and studying the mineral ash left deposited on the slide.

The author has applied this method to the liver cells of normal monkeys and others infected with yellow fever. The alterations in the size and shape of the nuclei and in the basophilic chromatin and in the nucleolus can be followed in the incinerated specimens from their mineral ash almost as clearly as in stained preparations, but the

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*In the summary of STEFANOPOULO's paper on the inoculation of *M. rhesus* with mouse yellow fever virus (*ante*, p. 354), for "16 passages in mice" in line 2 "161 passages in mice" should be read. The error was in the original paper (letter from Dr. Stefanopoulo).

characteristic intranuclear inclusions give little or no ash. They differ, therefore, in this respect from the intranuclear inclusions occurring in guineapigs infected with submaxillary virus. *E. H.*

STEFANOPOULO (G.). Sur le "diounde," à propos d'une enquête épidémiologique sur la fièvre jaune dans les pays de Ségou et de Macina (Soudan Français). [**"Dioundé," Epidemiological Inquiry into Yellow Fever in Ségou and Macina (French Sudan).**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 560–562. [11 refs.]

Diounde is the name given to an obscure disease occurring most frequently in the neighbourhood of Socolo about 60 miles N.W. of Macina. It affects all ages and generally occurs during the great heat of August and September. The disease in its clinical features is not unlike yellow fever, for it begins with a high fever accompanied by headache, especially occipital and orbital, and also pain in the legs. Loss of appetite and nausea are customary and vomiting is frequent. The temperature falls after 2 or 3 days but after a short apyrexia rises again. On the 5th or 6th day appear a slight jaundice of the conjunctiva which may increase in intensity. Some patients show glandular swelling. Usually the symptoms disappear between the 15th and 20th days, but convalescence is long and painful.

The author tested the sera of five patients that had recovered from this disease against *Spirochaeta autumnalis* A, *S. hebdomadis* and *S. icterohaemorrhagiae*, but no agglutination was obtained. In addition he made serum protection tests in mice with yellow fever virus, also with negative results. The nature of this disease, therefore, remains obscure. *E. H.*

ZUCCARINI (J. A.) & DEL PONTE (E.). **Yellow Fever in Eastern Bolivia and the Hygienic Preventive Measures adopted in Northern Argentina.**—*Folia Biol.* Buenos Aires. 1933. Feb., Mar. & Apr. Nos. 23–24–25. pp. 116–118. [Spanish version pp. 111–116.]

The existence of yellow fever at Santa Cruz de la Sierra in Eastern Bolivia in 1932 was confirmed by three commissions, one Bolivian and two Argentine, both by histopathological diagnosis of the liver material and serologically. In order to guard against the introduction of yellow fever across the frontier, the Argentine Republic has had an entomological study carried out in Northern Argentina. The Aëdes index was found to be very high in spite of the winter season, consequently a policy of "larvarial foci" has been established in the district. Hitherto no case of yellow fever has been found in the Argentine Republic, the three cases recorded last year having been wrongly diagnosed. *E. H.*

JOSEPH (Gaston). La lutte anti-stégomyienne à Dakar. [**The Anti-Stegomyia Campaign at Dakar.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 1021–1023.

During 1931, a total of 744 breeding places in Dakar have been destroyed, 181 being out of doors and the remaining 563 inside houses. These figures indicate the necessity of visits to houses in any anti-mosquito campaign of this nature. It is found that where running water is supplied Stegomyia tends to disappear; consequently every encouragement should be given to the extension of this system to all parts of the town. *E. H.*

BOYÉ. Les cas européens de fièvre jaune en Afrique Occidentale Française pendant l'année 1932. [**European Cases of Yellow Fever in French West Africa in 1932.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 1015–1020. With 2 maps.

A useful summary of the European cases of yellow fever in French West Africa during 1932, accompanied by two maps, one showing the distribution of these cases, and the other the results of protection tests obtained by STEFANOPOULO during his expedition of 1931–1932. A total of 42 cases with 37 deaths is recorded, all except two occurring in the Senegal, French Sudan and Guinea, whilst single cases occurred in Dahomey and the Upper Volta respectively. It is emphasized that these include only undoubted cases of the disease, all those being excluded in which there was any question of the diagnosis.

It is noted that there were 12 females and 30 males amongst the 42 cases, whilst the proportion of females among Europeans is only 1 in 25. It is suggested that the greater surface of the body exposed to the attacks of mosquitoes is responsible for the proportionately higher number of cases among women. *E.H.*

ARAGÃO (Henrique de Beaurepaire). Vaccinação contra a febre amarella—(Estado actual da questão).—*Brasil-Medico.* 1932. June 25. Vol. 46. No 26 pp. 573–574

BAUER (J. H.) & KERR (J. A.). Una enfermedad pirética confundida con la fiebre amarilla en la costa del Atlántico de Colombia.—*Bol. Oficina Sanitaria Panamericana.* 1933 July Vol 12 No 7 pp. 696–715.

PAULI (P.) La febbre gialla. Rivista sintetica.—*Sperimentale* 1932. Jan. 27. Vol. 86 No. 5–6. pp. 623–644 With 10 figs. on 3 plates. [48 refs.]

RELAPSING FEVER.

PALMER (J. H.) & CRAWFORD (D. J. M.). **Relapsing Fever in North America, with Report of an Outbreak in British Columbia.**—*Canadian Med. Assoc. Jl.* 1933. June. Vol. 28. No. 6. pp. 643–647. With 2 text figs. [16 refs.]

After reviewing the cases of relapsing fever that have been reported in North America, the authors give details of six cases of the disease occurring in the West Kootenay district of British Columbia where it seems to be endemic.

Spirochaetes were found in the blood of two of these patients. The wood tick *Dermacentor andersoni* Stiles, the commonest tick attacking man in this district, is considered the most probable vector, as bugs and lice are definitely excluded. [This is the first record of relapsing fever in Canada.] *E. Hindle.*

LEGGE (Robert T.). **Relapsing Fever : a New Etiological Observation : with Case Report of a Field Worker.**—*California & Western Med.* 1933. May. Vol. 38. No. 5. pp. 370–371.

An interesting record of a case of spirochaetal relapsing fever in Sierra County, California. The patient, a medical entomologist, was infected by the contamination of a wound with the blood of a freshly killed tamarack squirrel, which was subsequently found to contain spirochaetes by examination of blood smears and subinoculation into mice.

The patient developed a typical attack of relapsing fever, with spirochaetes in his blood, which also produced spirochaetosis when inoculated into mice. These results show that in California field rodents are victims of spirochaetosis which may be conveyed to man. The only tick found on these animals was a species of *Ixodes* and the natural vector of the disease remains uncertain. *E. H.*

NICOLLE (Charles), LAIGRET (J.) & SICARD (M.). Sur deux nouveaux cas de fièvre récurrente hispano-africaine observés en Tunisie (Cap Bon). [**Two New Cases of Spanish-African Relapsing Fever observed in Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 401–411. With 4 graphs & 1 map.

Two new cases of this relapsing fever have been found in Tunis, and in the case of one of the patients a study of the spirochaete in various laboratory animals, and especially its high pathogenicity for guineapigs, showed that it was allied to *S. hispanica*, Sadi de Buen.

The spirochaete was readily transmitted by *Ornithodorus erraticus* infected in the nymphal stage, and also survived 19 days in the louse. Ornithodorus collected in the neighbourhoods where the infected patients lived showed no signs of infection, nor has *S. hispanica* been found in five lots of *O. erraticus* comprising 148 individuals. It is noted that all the five cases of relapsing fever observed in Tunis have been found in the course of routine examinations of slides during anti-malarial campaigns, and it is likely that more cases will be found when these inquiries are extended. *E. H.*

PAVLOVSKIĬ (E. N.). [*Ornithodorus lahorensis* und das Verhältniss desselben zur Uebertragung des Zecken-Recurrens.] [**Transmission of Relapsing Fever in Turkmenistan by Ornithodorus Species.**]—*Murgabsk. Parazit. Eksped. 1930 Akad. Nauk SSSR i Narkomzdr. Turkm.* in *Trud. Sov. Izuch. proizvod. Sil*, Ser. Turkmen., 1932. Pt. 2. pp. 79–100. With 2 figs. Leningrad, Acad. Sci. [In Russian.] [Summarized in *Rev. Applied Entom.* 1933. May. Vol. 21. Ser. B. Pt. 5. p. 97.]

" In view of the lack of proof that *Ornithodorus lahorensis*, Neum., is a vector of relapsing fever, though this has been suggested, transmission experiments with it were carried out in Turkmenistan in the summer of 1930. This tick is widely distributed in Central Asia, but in Turkmenistan has only been found in the town of Ashkhabad, where nymphs were collected on camels that had arrived from Persia. The individuals used in the experiments originated from Persia, eastern Uzbekistan and Armenia. They were fed on guineapigs infected with Central Asiatic relapsing fever (*Spirochaeta sogdiana*) and then on healthy ones, but in no case were the latter infected, though the disease was readily transmitted to them by *O. papillipes*, Bir. When placed on man, *O. lahorensis* did not bite. Only 9 per cent. of the ticks emitted coxal fluid when biting. Injections of emulsions of salivary glands and malpighian tubes of ticks that had fed on infected guineapigs 23 days previously did not produce infection, but positive results were secured with an emulsion of the stomachs.

" From these investigations the author concludes that the only proved vector of the tick-borne relapsing fever of Central Asia is *O. papillipes*." *A. G. B.*

BLANC (Georges), NOURY (M.) & FISCHER (M.). Le rat gris " Mus norvegicus " réservoir de virus de la fièvre récurrente hispano-africaine. [**The Grey Rat " *Mus norvegicus* " as a Reservoir of the Virus of Spanish-African Relapsing Fever.**]—*Bull. Acad. Méd.* 1933. Apr. 25. 97th Year. 3rd Ser. Vol. 109. No. 16. pp. 587–591. With 3 charts.

The authors have examined the rats caught at Casablanca in order to see whether they were infected with relapsing fever. Each day for several days, the brains of 10 rats were ground up and inoculated into guineapigs and 7 out of 16 of these animals subsequently became infected with relapsing fever.

In one instance 4 specimens of *Mus rattus* had been included but all the others comprised only *Mus norvegicus*. These results indicate that at least 1 rat in 22 is infected, but reasons are given for considering the percentage of infected rats as considerably higher. It is evident, therefore, that at Casablanca the grey rat is an important reservoir of the local relapsing fever transmitted by *Ornithodorus marocanus*.

E. H.

STERNBERG (E. J.) & PINES (A. I.). Zum Problem der direkten und indirekten Wirkung in der Chemotherapie. V. Zur Therapie des Rückfallfiebers mit Antimonderivaten bei verschiedenen Tieren und beim Menschen. [**The Problem of Direct and Indirect Action in Chemotherapy. V. The Treatment of Relapsing Fever in Various Animals and Man with Antimony Compounds.**]—*Klin. Woch.* 1933. May 27. Vol. 12. No. 21. pp. 825–828. With 2 charts.

The authors studied the effect of treatment with an antimony-compound—Stibosan H471—on infection with *Spirochaeta usbekistanica* in mice, guineapigs and rabbits, as well as in man.

The results showed that in every case the infection was cured and the animals completely sterilized as far as this spirochaete was concerned. The authors consider that in this instance the results are opposed to the view that the therapeutic agent acts indirectly through the tissues of the host, since the same result was obtained in different animals infected with the same spirochaete. [W. " Jork " should read W. Yorke.] *E. H.*

HINDLE (E.) & ELFORD (W. J.). **The Filtration of Spirochaetes through Graded Collodion Membranes.**—*Jl. Path. & Bact.* 1933. July. Vol. 37. No. 1. pp. 9–16. [22 refs.]

The authors have re-examined the problem of the filterability of spirochaetes using graded collodion filters of known porosity in order to determine the limiting porosity of various strains, and also whether there was any evidence of the existence of an ultra-microscopic stage in their development.

The results show that the water leptospira *S. biflexa*, and the pathogenic *S. icterohaemorrhagiae* have limiting porosities of 0·25 μ and *S. pallida* a limit of approximately 0·40 μ. This is interpreted as indicating a diameter of 0·1 μ for the former and 0·20 μ for the latter. The corresponding figures obtained from photographs using the ultraviolet darkground method were approximately 0·11 μ and 0·33 μ. The spirochaetes passed readily through the membranes and this method furnishes a simple and effective means of separating spirochaetes, including *S. pallida*, from other organisms.

No evidence was obtained of the existence of any special filterable phase, significantly smaller than the diameter of the spirochaete.

E. H.

CHORINE (V.). La sérofloculation de Henry dans la spirochétose des poules. [**Henry's Serum-Flocculation in Fowl Spirochaetosis.**]—*C. R. Soc. Biol.* 1933. Apr. 1. Vol. 112. No. 12. pp. 1164–1165.

This reaction is found to be positive in fowls infected with spirochaetosis The flocculation begins to show with the sera of fowls 5–6 days after the febrile attack and persists for 30–50 days in recovered birds. This disease is accompanied by marked degeneration of the red cells. *E. H.*

LEPTOSPIROSIS.

SOUCHARD. Contribution à l'étude de la fièvre ictérohémorragique en Cochinchine. Recherche du spirochéta-ictérohémorrhagiae chez les rats de Saigon. [**Study of Spirochaetal Jaundice in Cochin China.** *S. icterohaemorrhagiae* **in the Rats of Saigon.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1933. Jan.–Feb. Vol. 11. No. 1. pp. 11–15.

By inoculating guineapigs with the organs of wild rats (*Mus decumanus*) caught in Saigon, the author found that 4 out of 110 became infected with spirochaetal jaundice, which shows that the percentage of infected rats is not very high in comparison with the numbers in other parts of the world. *E. Hindle.*

GAEHTGENS (W.). Beitrag zur Serodiagnose der Weilschen Krankheit. [**A Study of the Serum Diagnosis of Weil's Disease.**]—*Klin. Woch.* 1933. May 6. Vol. 12. No. 18. pp. 697–698.

During the autumn of last year the author tested the agglutination test and fixation of the complement with the sera of 70 patients showing symptoms suggestive of Weil's disease. Twenty-nine serologically positive sera were found, and there was a fairly close agreement between the results obtained by the two methods.

The antigen for the complement fixation test was obtained by centrifuging well-grown cultures of the spirochaetes for 3 to 4 hours at 3,000 revolutions per minute, and making a 10 per cent. suspension of the sediment in normal saline containing 0·3 per cent. phenol. As a rule agglutination went to higher titres than fixation of the complement, but the latter is of value as a control, especially in doubtful cases. *E. H.*

POSTMUS (S.). Het beloop van de seroreactie bij oudlijders aan de ziekte van Weil. [**Serum Reactions in Long Recovered Cases of Weil's Disease.**]—*Nederl. Tijdschr. v. Geneesk.* 1933. June 10. Vol. 77. No. 23. pp. 2648–2651. French summary (4 lines).

In Holland the agglutinins and lysins persist for at least 17 years after an attack of Weil's disease, whilst in the Dutch East Indies, on the contrary, the serological properties of recovered patients only persist for comparatively short periods. *E H.*

RAT-BITE FEVER.

STEWART (R. Cameron). **Rat-Bite Fever in Canada.**—*Canadian Med. Assoc. Jl.* 1933. June. Vol. 28. No. 6. pp. 608–613. With 1 chart in text. [51 refs.]

A brief history and general description of sodoku, in which it is noted that 85 cases have been recorded from North America. Seven cases which occurred in Canada during the past 10 years are recapitulated in a series of case reports. Six of these cases occurred in Montreal from which it is inferred that a cônsiderable proportion of the rats there must be infective. *E. Hindle.*

PONS (R.). Spirellose fébrile Cochinchinoise. [**Febrile Spirillosis of Cochin-China.**]—*Rev. Méd. et Hyg. Trop.* 1933. Jan.–Feb. Vol. 25. No. 1. pp. 17–23. With 3 figs.

Under the name of *Spirochaeta sinense* the author has described a spiral organism occasionally found in the blood of patients in Cochin China [see this *Bulletin*, Vol. 21, p. 471. From the present description of the cases this infection would seem to be *Spirillum minus.*]

E. H.

MOUREAU (M.) & LE CHUITON (F.). Le chien peut conserver dans son organisme les spirellas du sodoku. [**The Spirilla of Sodoku can persist in the Dog.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 26. pp. 1206–1208.

Three dogs were inoculated with *S. minus* ; one remained negative but the other two, although showing no clinical signs of the disease, both showed spirilla in the blood. The disease was transmitted from both these dogs to guineapigs by the inoculation of blood. Attempts to infect guineapigs by means of the saliva of all three dogs gave negative results, but the presence of spirilla in the blood shows that the dog is a possible carrier of sodoku. *E. H.*

OZEKI (Yaichiro). Ueber Haarausfall der Mäuse durch *Spirochaeta morsus muris.*]—*Japanese Jl. Dermat. & Urol.* 1933. Mar. Vol. 33. [**The Loss of Hair in the Mouse caused by** *S. morsus.*] No. 3. [In Japanese pp. 330–374. With 11 figs. (3 coloured) on 2 plates & 42 text figs. [43 refs.] German summary pp. 52–54.]

A detailed account of the histological changes occurring in mice infected with *Spirillum minus,* with special reference to the pathological changes leading to the loss of hair in the affected animals. Loss of hair occurs within one to two months after infection and affects mainly the belly and chest, and the nasal line including the eyes and ears. There is a slight reddening of the regions where the hair falls out, and histologically the epithelial cells show numerous vacuoles. There is a plentiful cell infiltration of the cutis and subcutis. Between the infiltration and the hair follicles there seems to be a vague connexion and there may be accumulation of cells around the follicles. These changes occur from the 14th day onwards, when the spirilla are extremely rare in the epithelial tissues. They are most numerous in the skin from the 28th to 33rd day after inoculation, and by the 50th day have almost disappeared. The spirilla are much more numerous in the body cavity than in the skin. They are not particularly numerous around the hair follicles, and the loss of hair would seem to be the result of the cell infiltration accompanying the invasion of the epithelial tissues. *E. H.*

PROTOZOOLOGY.

FARJOT (A.). Les protozooses intestinales dans la région du Nord. [**Intestinal Protozoa of the Nord, France.**]—*C. R. Soc. Biol.* 1933. Jan. 20. Vol. 112. No. 2. pp. 200–201.

The examination of a single sample of the faeces of 1,200 patients at the Institut Pasteur of Lille has shown the presence of all the common intestinal protozoa of man. Of the persons with *Entamoeba histolytica* infections, it was noted that 65 per cent. had at one time or another lived in the colonies. The contrary was the case with the giardia infections; 68·5 per cent. had never left France.

C. M. Wenyon.

LÖRINCZ (F.). Ueber das Vorkommen von menschlichen Darmprotozoen in Ungarn. [**Human Intestinal Parasites in Hungary.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 276–282.

The examination of the stools of 1,206 individuals in Hungary has revealed one or other of the six common intestinal protozoa in 40·9 per cent. It is noted that though *Entamoeba histolytica* infections occur amoebic dysentery is absent, while the amoeba is of very low pathogenicity to cats. The author concludes that the Hungarian strain of amoeba is apathogenic or represents a distinct species, possibly *E. dispar* Brumpt, 1925. *C. M. W.*

TALIAFERRO (William H.). **Infection and Resistance in the Blood-inhabiting Protozoa.**—Reprinted from *Science.* 1932. June 17. Vol. 75. No. 1955. pp. 619–629. With 4 figs. [33 refs.]

The author's work on the mechanism of immunity in protozoal infections is well known, his various papers on the subject having been reviewed from time to time in this *Bulletin.* In the present lecture he summarizes the main results he has obtained in the case of *Trypanosoma lewisi* infection of rats and *Plasmodium cathemerium* infection of canaries.

In the case of the trypanosome he has demonstrated at least two distinct antibodies: the one, which he names ablastin, interferes with the trypanosomes only in that it prevents reproduction, the other is definitely trypanocidal. It would appear that the trypanocidal substances which bring about the first reduction in the number of trypanosomes in the blood is different from that which causes their final destruction when recovery occurs. These substances coexist in the blood but can be separated, for the trypanolytic antibodies are absorbed by trypanosomes which are thereby sensitized so that they are immediately destroyed if injected into a rat, whereas the anti-reproductive substance is not absorbed by trypanosomes which can readily be washed free of it. These antibodies can be transferred by inoculation from rat to rat.

In the case of bird malaria immunity is of another type and is not transferable from bird to bird, for it is due to direct phagocytosis of infected red blood corpuscles by the macrophages, which commences about four hours after a bird has been inoculated and increases throughout the infection with an increase in the reticulo-endothelial system. In this type of immunity there is no reproduction-inhibiting factor. In birds which have recovered the inoculation of a large number of parasites is followed by their rapid destruction whereas in normal birds the inoculation of a similar dose of parasites is followed by an overwhelming infection. The immunity or power of rapid recovery in the recovered bird is, however, specific and does not extend to all species of bird malarial parasite. Whether this indicates the presence of a specific activating substance in the blood or not has not yet been determined. It would seem possible that though immunity in bird malaria is chiefly cellular there may be a humoral element, just as in the case of the *T. lewisi* infections there is also probably a cellular element, for recurrence of reproduction may follow splenectomy.

All these investigations are of importance from the point of view of immunity in human disease, and the author is approaching the subject of immunity in human malaria by a study of monkey malaria in which he has already found evidence of a parallelism with bird malaria. In conclusion, the author draws attention to the particular value of the blood protozoa for the study of what he believes to be the fundamental problems of immunity. *C. M. W.*

ANDREWS (Mary N.). **A Simple Method of Staining Protozoa in Faecal Films.**—*Chinese Med. Jl.* 1932. May. Vol. 46. No 5. pp. 476–477.

Wet fixed films of faeces containing intestinal protozoa are usually stained by the iron haematoxylin method or by a simple stain such as Mayer's acid haemalum which requires no differentiation. In this note the author calls attention to the fact that films fixed in Schaudinn's solution may conveniently be stained with Mallory's phosphotungstic haematoxylin made by adding 20 cc. of a 10 per cent solution of phosphotungstic acid to 80 cc. of distilled water in which 0·1 gm. of haematoxylin has been dissolved. The mixture, which is ready for use after a fortnight's ripening, keeps indefinitely.

C. M. W.

WEISE (W.). Ueber die Giemsafarbung mit gepuffertem Wasser. [**Giemsa Staining with Buffered Water.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 327–337. With 1 coloured plate. [37 refs.]

The author advocates the use of buffered water (pH 7·2) for diluting Giemsa stain.

Not only are constant results obtained, but many natural waters can be used if buffered with the appropriate salts. For special purposes, as for instance the demonstration of stippling on the red blood corpuscles infected with quartan malarial parasites, water buffered to a pH of 7·5 can be used with advantage. The paper describes the method of staining films and sections and gives instructions for preserving the water after buffering from changes due to carbon dioxide in the air. *C. M. W.*

SUAREZ PEREGRIN (Eduardo). Nota previa sobre una nueva aplicación del método de Giemsa para la coloración de los protozoos fecales. [**New Method of Staining Protozoa in Faeces.**]—*Medicina Países Cálidos.* Madrid. 1933. Jan. Vol. 6. No. 1. pp. 5–7. French summary (4 lines).

For staining intestinal protozoa the author has had good results by making films of a mixture of faeces and serum and then fixing them with methyl alcohol and staining with Giemsa as in ordinary blood film work. *C. M. W.*

DESCHIENS (R.). Culture de l'amibe dysentérique et nutrition de cette amibe dans les cultures. [**Cultivation of the Amoeba of Dysentery.**]—*1er Congrès Internat. de Microbiologie, Paris, 1930.* Vol. 2. pp. 453–456. 1932. Paris: Masson et Cie.

The paper is essentially the same as that reviewed in this *Bulletin,* Vol. 27, p. 275. It is, however, pointed out that the replacement of the powdered dry fish or beef muscle, which was added to the medium referred to just before inoculation with amoebae, by powdered liver, casein, cooked red blood corpuscles or certain vegetable proteids did not lead to any improvement in the culture of amoebae. The presence of ox bile in a strength of 9 per cent. in the liquid portion of the medium stops the growth, while amoebae are rare with strengths of 6 to 8 per cent. *C. M. W.*

KITABATAKE (Eitaro). **Experimental Studies on Amoebic Dysentery. I. On the Vital Staining of** *Entamoeba histolytica.*—*Jl. Oriental Med.* 1933. Mar. Vol. 18. No. 3. [In Japanese. English summary p. 30.]

Testing as many as 167 different stains, the author has found that vital staining of *Entamoeba histolytica* occurs only in the case of basic stains. Stained granules occur only in the endoplasm though the ectoplasm is occasionally stained diffusely. *C. M. W.*

HALAWANI (A. E.). **A Brief Note on a Case of** *Dientamoeba fragilis* **Infection found in Egypt.**—*Jl. Egyptian Med. Assoc.* 1933. Jan. Vol. 16. No. 1. pp. 94–95.

In the stools of a patient in Cairo who, two months before, had been treated with yatren for *Entamoeba histolytica,* large numbers of *Dientamoeba fragilis* were found. The author, who states that in 1930 in England he maintained this amoeba in culture for a few months, notes that this is the first record of its occurrence in Egypt.

C. M. W.

HEGNER (Robert). **Differential Reactions of Species and Strains of Trichomonad Flagellates to Changes in the Environment.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 513–522.

The author states that the object of the experiments described in this paper was to differentiate species, and strains of the same species of trichomonad flagellates, by means of their reactions to changes in culture media and in temperature.

Three species were employed, *Trichomonas hominis, T. buccalis,* and *T. parva.* Of the last, two strains were used and it was found that according to the test applied they differed from one another more widely than strains of different species from different hosts. Details are given of the relative value of various media, the influence of exposure to various temperatures, the tendency to the ingestion of red blood corpuscles and starch grains and other matters bearing on the subject. *C. M. W.*

SIMIĆ (Tsh.). Le *Trichomonas parva* Alexeief du rat est-il le même que le *Trichomonas intestinalis* Leuckart de l'homme? **[Is *T. parva* of the Rat Identical with *T. hominis*?]**—*Ann. Parasit. Humaine et Comparée.* 1933. Jan. 1. Vol. 11. No. 1. pp. 7–16. With 2 figs.

The rat is liable to infection with two species of trichomonas—a large one, *T. muris*, and a small one, *T. parva*. The author claims to have shown that, as regards its morphological and cultural characteristics and its power of infecting experimentally dogs, cats and human beings, the small one is identical with *T. intestinalis* (*T. hominis*) of man, except that the majority of the flagellates possess three instead of four free flagella. Certain rounded forms are figured as cysts. These have been seen by many observers, but the author produces no more evidence than that already existing that they are cysts and not merely unencysted rounded flagellates. *C. M. W.*

BLAND (P. Brooke), GOLDSTEIN (Leopold), WENRICH (D. H.) & WEINER (Eleanor). **Studies on the Biology of *Trichomonas vaginalis*.**—*Amer. Jl. Hyg.* 1932. Sept. Vol. 16. No. 2. pp. 492–512. With 10 figs. [31 refs.]

The authors give an account of a careful study of the morphological and biological characters of *Trichomonas vaginalis*, the paper being a continuation of others previously published.

The great range in size of the organism is noted and it is suggested that the smaller forms, if not representing a distinct species, may be the result of autotomy or the discarding of portions of the cytoplasm of the larger forms. The organism has been cultivated and its behaviour in various media is described. No direct evidence was obtained that *T. vaginalis* was one of the other species of human trichomonas. Attempts to infect the vagina of the rat and guineapig failed.

C. M. W.

WITTE (J.). Bakterienfreie Züchtung von Trichomonaden aus dem Uterus des Rindes in einfachen Nährboden. **[Bacteria-Free Cultivation of Trichomonas from Uterus of Cow.]**—*Zent. f. Bakt.* I. Abt. Orig. 1933. Apr. 28. Vol. 128. No. 3/4. pp. 188–195. With 3 figs. [26 refs.]

By inoculating the bacteriologically sterile uterine contents of cows into various media, bacteria-free cultures of trichomonas were obtained.

The organism grows readily in various media, the simplest being serum bouillon or peptone bouillon to which 5 to 10 per cent. of defibrinated horse, ox, sheep or goat blood has been added. The author thinks that the trichomonas differs from forms hitherto described and proposes to name it *Trichomonas genitalis* in spite of the fact that RIEDMÜLLER in 1928 suggested the name *Trichomonas foetus* for the same organism. *C. M. W.*

POGGI (Igino). Infestazione da *Giardia intestinalis* nei bambini. **[Giardiasis in Children.]**—*Arch. Ital. Sci. Med. Colon.* 1933. May 1. Vol. 14. No. 5. pp. 332–351. With 1 fig. [33 refs.] English summary (6 lines).

In the course of examining 1,100 children in Milan the author found *Giardia lamblia* in the stools of 98 or 9 per cent. of whom 38 either had at the time, or intermittently in the past, symptoms of gastro-enteritis. Of the 98 there were 67 male and 31 female while more than two-thirds (68) were below the age of 8 years. *H. H. S.*

BROMBERGER & v. ARNIM. Ueber gehäuftes Vorkommen von Lambliosis intestinalis in einem Arbeitsdienstlager in der Mark. [**Focus of Lamblia Infection in a Labour Camp in Prussia.**]—*Muench. Med. Woch.* 1933. Jan. 6. Vol. 80. No. 1. pp. 12–13.

The investigation of cases of gastro-enteritis which occurred in a labour camp revealed the fact that 50 per cent. were infected with lamblia. Of 14 healthy individuals only 2 were found to be infected. Treatment with a single injection of 0·6 gm. of neosalvarsan brought about a disappearance of the symptoms and the infection.

C. M. W.

GALLIARD (H.). Infections à *Trypanosoma duttoni* Thiroux chez les animaux splénectomisés. [***T. duttoni* Infection in Splenectomized Animals.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 609–613.

The author has tested the influence of splenectomy in the case of *Trypanosoma duttoni,* a trypanosome which normally behaves in mice as does *T. lewisi* in rats.

Mice inoculated 24 to 48 hours after splenectomy acquire infections which are very much heavier than normal if the injections have been made intraperitoneally, but not if made subcutaneously. The duration of the infections, however, varies little from the normal. If splenectomy is performed during an established infection it has little influence, except that it appears to inhibit reproduction of the trypanosomes if performed a very short time after inoculation, or to produce in some cases a temporary disappearance of the parasites and to lengthen the duration of the infection if performed two to three months after.

C. M. W.

GALLIARD (H.). La culture de *Trypanosoma somalense* Brumpt 1903 de *Bufo regularis.* [**Cultivation of *T. somalense* of the Toad.**]—*C. R. Soc. Biol.* 1933. Apr. 10. Vol. 112. No. 13. pp. 1325–1327.

From the heart blood of the African toad, *Bufo regularis,* specimens of which were brought to France by BRUMPT from the Sudan, cultures of *Trypanosoma somalense* Brumpt were obtained.

The trypanosome grows readily in almost any medium containing blood and remains alive for many months at 20°C. to 25°C. if drying is prevented. The cultural forms in most media are exclusively of the leptomonas or crithidia type, trypanosome forms appearing only in cultures made in Ponselle's hypotonic medium consisting of equal parts of doubly distilled water and defibrinated rabbit's blood. The trypanosome differs from *T. inopinatum* of the edible frog which directly from the frog's blood will, as a rule, grow only in Ponselle's medium though subcultures will succeed in other media. In Ponselle's medium the author has also cultivated *Trypanosoma cruzi* and *T. parroti* of *Discoglossus pictus.* *C. M. W.*

Katayama (N.). Experimentelle Untersuchungen ueber die Infektion von Ratten mit Kulturformen des *Trypanosoma Lewisi* von der Maulschleimhaut aus. I. Mitteilung. **[Infection of Rats by the Mouth with Culture Forms of** *T. lewisi*.]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Mar. 31. Vol. 128. No. 1/2. pp. 125–129.

Unlike the blood forms, but like the infective forms in the faeces of fleas, the cultural forms of *Trypanosoma lewisi* are able to pass through the intact mucous membrane of the mouth of rats and to produce infections. *C. M. W.*

i. Nattan-Larrier (L.) & Noyer (B.). Infection expérimentale du rat par le trypanosome du hamster. **[Experimental Infection of Rat with Hamster Trypanosome.]**—*C. R. Soc. Biol.* 1932. Dec. 16. Vol. 111. No. 39. pp. 887–889.
ii. —— & ——. Les cultures du trypanosome du hamster (*Trypanosoma rabinowitchi*). **[Cultivation of the Hamster Trypanosome.]** —*Ibid.* 1933. Feb. 17. Vol. 112. No. 6. pp. 523–525.
iii. —— & ——. Formes de multiplication de *Trypanosoma rabinowitchi* dans le péritoine du Rat.—*Ibid.* Vol. 113. No. 18. pp. 143–146. With 11 figs.
iv. —— & ——. Multiplication et division des formes schizogoniques de *Trypanosoma rabinowitchi*.—*Ibid.* No. 24. pp. 831–834. With 2 figs.
v. —— & ——. Les enveloppes capsulaires des formes schizogoniques de *Trypanosoma rabinowitchi*.—*Ibid.* No. 25. pp. 1011–1014. With 2 figs.
vi. —— & ——. Cycle évolutif de *Trypanosoma rabinowitchi* dans le péritoine du rat.—*Ibid.* No. 26. pp. 1111–1115. With 2 figs.

As other observers have noted, the authors have found it impossible to infect rats with *Trypanosoma rabinowitchi* by inoculating them with the blood of infected hamsters. On the other hand they have succeeded in infecting them by intraperitoneal injection of 3-months-old cultures on rabbit blood agar or 48-hours-old cultures on rat blood agar. In both cases the cultures contained trypanosome forms of the parasite. A first or even a second subinoculation could be made, but never a third. It was noted that the injection of cultures into the peritoneal cavity of the rats was followed by rapid multiplication of the trypanosomes locally and that this peritoneal infection persisted after the blood forms had disappeared. By subinoculating rats intraperitoneally with peritoneal exudate instead of with the blood it was possible, commencing with newly-born rats, to carry on the infection even in adult rats for as many as seven passages.

The authors continue the record of the results of their experiments with *Trypanosoma rabinowitchi* of the hamster. It is shown that the trypanosome grows better in a medium made with the blood of the white rat than with that of the rabbit. Growth appears to be better at 37°C. and metacyclic trypanosomes are produced more rapidly at this temperature than at 18°C.–22°C.

By injection of cultures into the peritoneal cavity of young rats a blood infection of ordinary trypanosome forms results. In the peritoneal cavity, however, a remarkable type of developmental form occurs. This may be regarded as having been produced by repeated division of the nucleus and formation of new flagella associated with a broadening of the flagellar end of the organism without division of the cytoplasm. There result large triangular or fan-shaped organisms in which a row of nuclei and blepharoplasts, each with its flagellum, occupy the base of the triangle. There may be as many as 120 nuclei, such a form measuring 100 μ to 105 μ across. It is evident that this is a condition of extreme delay in cytoplasmic division while nuclear division has been proceeding.

It would appear that the triangular form of the multinucleate individuals is retained on account of a kind of capsule which prevents the cytoplasm from dividing. If the multinucleate mass escapes from the capsule rapid segmentation into ordinary crithidia forms occurs. The capsule is a definite structure which stains a pink colour, and which, by moving the objective up and down, can be seen to be striated. Preparations made from the peritoneal exudate of rats on the third day of the infection reveal numerous empty capsules.

A further study reveals the fact that a few drops of culture inoculated into the peritoneal cavity of young rats is followed by a period in which no flagellates are detectable, a later one in which the schizogonic forms described above occur, and a final one in which trypanosomes of the blood type appear to be followed by the entry of these forms into the blood, the whole cycle occupying three to four days. The suggestion is made that the schizogonic forms are comparable with developmental stages in the flea, and that this trypanosome together with perhaps *T. primatum* should be classified in a special group apart from other trypanosomes. *C. M. W.*

SCHWETZ (J.). Sur les parasites malariens (*Plasmodium*) des singes supérieurs (anthropoides) africains. [**Malarial Parasites of African Anthropoids.**]—*C. R. Soc. Biol.* 1933. Feb. 24. Vol. 112. No. 7. pp. 710–711.

The examination during three months of the blood of a chimpanzee about a year old, every day or on alternate days, at Stanleyville showed that malarial parasites were constantly present. They varied in character from day to day but could be classified as belonging to the three species commonly found in man. It was concluded that the chimpanzee had a triple infection. *C. M. W.*

SCHWETZ (J.). Sur les parasites malariens (*Plasmodium*) des singes inférieurs africains. [**Malarial Parasites of the Lower African Monkeys.**]—*C. R. Soc. Biol.* 1933. Apr. 1. Vol. 112. No. 12. pp. 1220–1222.

The examination of the blood of a large number of monkeys belonging to different genera in the Belgian Congo has revealed malarial parasites which do not correspond entirely with the descriptions of *Plasmodium kochi*. The author thinks that a new name should be given to the parasite or the description of *P. kochi* modified. What is a little confusing is the statement in one place that adult schizonts occur in the peripheral blood, and in another that the division forms in red blood corpuscles have not been found on a single occasion. The parasite requires to be studied in its whole cycle, possibly in experimentally inoculated animals. *C. M. W.*

JAMES (S. P.), NICOL (W. D.) & SHUTE (P. G.). **Plasmodium ovale Stephens 1922.**—*Parasitology.* 1933. Feb. Vol. 25. No. 1. pp. 87–95. With 14 coloured figs. on 1 plate. [14 refs.]

In this paper the authors give some further details of the morphology of *Plasmodium ovale* both in man and *Anopheles maculipennis*, particularly from the point of view of the identification of the parasite, which will be considerably simplified by the beautiful coloured plate by Mr. JOBLING illustrating the paper.

A discussion of previous records of parasites which may or may not have been *P. ovale* leads to the conclusion that CRAIG described but did not name the parasite in 1900 and that the form recorded by EMIN in 1914, which was commented upon and named *Plasmodium camarense* by ZIEMANN, was either a severe infection of *P. falciparum* with schizonts in the blood or a mixed infection of this parasite and *P. vivax*. A very important point is made, namely that in blood films of other malarial parasites of man occasionally abnormal forms bearing some resemblance to *P. ovale* may be seen, but this is not sufficient to warrant the conclusion that *P. ovale* is an abnormal form of one of the commoner parasites. It is the discovery of all stages of development and their constant morphological character, that justifies the establishment of *P. ovale* as a distinct species.

C. M. W.

GARNHAM (P. C. C.). **A Note on the Subtertian Malaria Parasite of Kenya.**—*East African Med. Jl.* 1933. June. Vol. 10. No. 3. pp. 68–84. With 1 plate & 1 folding chart. [22 refs.]

The author points out that owing to the fact that relatively large forms of the malignant tertian parasite occur commonly in the peripheral blood of cases of malaria in Kenya, infections with this parasite have often been diagnosed as quartan malaria. The realization of the fact that the infection was not of this nature has led the author to study the Kenya parasite carefully. He has come to the conclusion that it differs from the classical malignant tertian parasite.

Thus small unpigmented rings occur in the blood, but they are always accompanied or followed by solid (or slightly vacuolated) large and sometimes pigmented parasites. The pigment instead of being a fine black granular formation in the early stages and a black mass in the later ones, is at first a fine yellow powder which later becomes a collection of dark granules with a bright lustre in a golden vacuole. Finally the schizont of the Kenya parasite frequently occupies three-quarters or more of the red blood corpuscle and is commonly found in the peripheral blood instead of being rare in the blood and occupying only a third or a half of the red cell. Certain forms corresponding with the description of *Plasmodium tenue* of man occur but they could not be differentiated as a distinct species.

It seems quite possible that the Kenya form of the malignant tertian parasite may be distinct from that of Europe and other places, but the reviewer is led to wonder if some of the differences noted by the author may not have been due to the "modified ROMANOWSKY method of staining." In any case he is comparing the Kenya parasite with those which were certainly not stained by this method. The diagnosis of the parasite, the author emphasizes, may be established only after the examination of several films, while complete confirmation may entail culture of the parasite or spleen puncture. It is evident that further observations are required and comparisons made under absolutely identical conditions before the actual differences can be accurately defined. *C. M. W.*

ALESSANDRINI (Giulio). Sopra un particolare meccanismo di sviluppo (amitosi) della *Laverania malariae* e sulla genesi delle perniciose. [**Development of** *Plasmodium falciparum.*]—*Arch. f. Protistenk.* 1933. Vol. 79. No. 3: pp. 356–379. With 9 figs. & 2 plates (1 coloured). [17 refs.]

The possibility that the parasite of malignant tertian malaria is able to reproduce by binary fission in its young stages as well as by the recognized method of multiplication by schizogony has been suggested by a number of observers. LE DANTEC (1929) quoted by the author of the paper under review, was emphatic on this point, and recorded in support of the view a fatal case of malaria in which ring forms of *P. falciparum* alone were found in the blood during life and in enormous numbers in the spleen after death.

To test the accuracy of these views the author has made direct observations on the blood. His technique was to place a small drop of blood from a malarial case on the centre of a cover glass, and to invert it over a hollow slide containing a drop of saline solution. The hanging drop preparation sealed with vaseline was studied on the warm stage. Not only does he claim to have followed the actual division of the young parasites, but also the penetration of red blood corpuscles by free merozoites, thus confirming as no other person has yet done, SCHAUDINN'S observations and, what seems to be more remarkable, the division of the nucleus of the young parasite which precedes division of its cytoplasm. He does not say what magnification was employed, but the drawings depicting these processes suggest that at least an oil immersion lens was used. In the drawings the parasites and the nuclei are very clearly defined, more clearly even than one would expect to see them in the thinnest preparation of fresh blood observed with the highest power and best illumination. In the author's case, as noted above, a hanging drop in which it must be very difficult to observe single parasites was used. The author furthermore, states that the division is amitotic, a term which he seems to use as synonymous with binary fission, which of course it is not. In addition to the statements noted above there is much speculative matter in the paper regarding the possible rate of multiplication of the malarial parasite by this rapid method of binary fission and the conditions under which it occurs. The conclusion is that reproduction by this method takes place only when the power of organic defence of either man or the mosquito, or both, against the malarial parasite is found to occur.

It is clear that much confirmatory work is required before the views expressed can be accepted. *C. M. W.*

BOUCHER (H.). Coloration vitale de mitochondries dans le *Plasmodium vivax.* [**Vital Staining of Mitochondria in** *P. vivax.*]—*C. R. Soc. Biol.* 1933. Mar. 10. Vol. 112. No. 9. pp. 882–883.

Mitochondria can be demonstrated in the malaria parasite *Plasmodium vivax* by vital staining with Janus green.

The stain is prepared as follows: Of a saturated solution in absolute alcohol of neutral red 0·4 cc. is added to 10 cc. of absolute alcohol to which is added also three drops of a saturated alcoholic solution of Janus green. A drop of this is allowed to dry on a perfectly clean slide and the moist blood preparation is made on the thin film of stain. The mitochondria in the form of spherical granules stained by the Janus green half a micron in diameter vary in number from 1 to 20 according to the size of the parasite. The neutral red stains granules in the red blood corpuscles, the rose coloration assumed by the cytoplasm of the parasite being due to a reduction product of the Janus green. *C. M. W.*

MANWELL (Reginald D.). **The Behavior of the Avian Malarias in the Common Fowl, an Abnormal Host.**—*Amer. Jl. Trop. Med.* 1933. Jan. Vol. 13. No. 1. pp. 97–112. [13 refs.]

To test the susceptibility of the common chicken (*Gallus gallus*) to bird malaria, a number were inoculated with five species of parasite available: *Plasmodium praecox, P. circumflexum, P. cathemerium, P. rouxi* and *P. elongatum*. Infections lasting from three to ten days were produced by the first three only, but these were so slight that usually they could only be detected by inoculating the chicken's blood into canaries. Occasionally, however, gametocytes could be seen in the blood so that it is presumed mosquitoes might become infected by feeding on such chickens. *C. M. W.*

CHORINE (V.). Conditions qui régissent la fécondation de *Plasmodium praecox.* [**Conditions regulating the Fertilization of** *P. praecox.*]—*Arch. Inst. Pasteur d'Algérie.* 1933. Mar. Vol. 11. No. 1. pp. 1–8.

The author, who in collaboration with MARCHOUX (this *Bulletin*, Vol. 29, p. 817) studied the factors regulating the fertilization in the case of the Haemoproteus of the Java sparrow, has now shown that in the case of the malignant tertian malarial parasite the regulation is the same. The reason why flagellation does not occur in the blood is that carbon dioxide is present. Its escape from the blood after removal from the body allows flagellation to occur. There is nothing specific in the carbon dioxide as any acid acts in the same way.

C. M. W.

GARNHAM (P. C. C.). **On Some Curious Bodies found in Erythrocytes containing Immature Crescents.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. Jan. 31. Vol. 26. No. 4. pp. 401–403. With 1 plate.

Working in East Africa the author has noted that the red blood corpuscle containing a developing crescent of *Plasmodium falciparum* may in addition contain a dark red rod which, if short, may be straight, or if too long for the cell twisted into a ring or loop or coiled. These structures, which are best seen in films stained deeply enough to show Maurer's clefts, have a very striking appearance as shown in the illustration accompanying the paper. Their nature is obscure.

C. M. W.

HEWITT (James Arthur). **Sarcosporidiasis in Human Cardiac Muscle.**—*Jl. Path. & Bact.* 1933. Jan. Vol. 36. No. 1. pp. 133–139. With 4 figs. on 2 plates. [17 refs.]

In sections of human heart muscle being used for instructional purposes sarcosporidia were discovered. On account of bad fixation the author says that the material was "obviously of very limited use for detailed observation of the cysts and the cytology of the contents," yet he describes peculiarities in the shape and size of the spores and even considers the possibility of a distinct species of parasite being represented. *C. M. W.*

FENG (Lan-Chou). **Sarcosporidiosis in Man. Report of a Case in a Chinese.**—*Chinese Med. Jl.* 1932. Oct. Vol. 46. No. 10. pp. 976–981. With 3 figs. on 1 plate. [13 refs.]

A record of sarcosporidial infection of a Chinese, discovered when a small piece of muscle removed from the thigh at operation for diagnostic purposes was sectioned. *C. M. W.*

TANABE (Misao) & KOMADA (Kan-ichi). **On the Cultivation of** *Balantidium coli*.—*Keijo Jl. of Med.* 1932. Sept. 30. Vol. 3. No. 3. pp. 385–392 (45–52). With 2 figs. [11 refs.]

The paper describes the cultivation of *Balantidium coli* from the pig in Fränkel's medium to 16 parts of which 1 part of horse serum is added.

The medium consists of asparagin 4 gm.; ammonium lactate 6 gm.; K_2HPO_4 2 gm.; NaCl 5 gm.; distilled water 1,000 cc. After autoclaving, the medium is cooled, the serum added and 10 cc. amounts distributed in test tubes. To each tube just before use three loops of rice starch sterilized by dry heat are added In this at temperatures from 30°C. to 37°C., but not below, the ciliate grows readily but aerobically and anaerobically. Conjugating forms were frequently observed but cysts were absent. *C. M. W*

HANNEBORG (Øystein). Balantidium coli-diaré og intestinal polypose. [*Balantidium coli* **causing Intestinal Polyp and Diarrhoea.**]—*Norsk. Mag. f. Laegevidenskapen.* 1933. June. Vol. 94. No. 6. pp. 650–659. With 2 figs. English summary. [41 refs.]

A farmer, 67 years of age, was admitted to hospital with a history of diarrhoea of three years duration. Examination revealed intestinal polyposis and infection with *Balantidium coli.* Treatment with hexamethyltetramine by the mouth and injections of 1 per cent. quinine solution per rectum cured the patient, though the intestinal polyps remained unaltered. *C. M. W.*

FRANCHINI (G.) & TADDIA (L.). Sopra un caso di balantidiosi. [**Infection by** *Balantidium coli*.]—*Arch. Ital. Sci. Med. Colon.* 1933. May 1. Vol. 14. No. 5. pp. 321–325. English summary (5 lines).

The case here described, the second to be diagnosed at the Institute of Colonial Pathology, Bologna and Modena, is that of a woman of 40 years complaining of colicky pains, tenesmus, and loose stools containing mucus; *Balantidium coli* was present in abundance.

Enemata of yatren 105 led to a speedy cure which appears to be permanent, no parasites having been seen after repeated search.

H. H. S.

NAGAHANA (Misao). **The Morphology and Culture of a Balantidium found in the Wild-Rat** (*Mus norvegicus* **Erxl.**).—*Keijo Jl. of Med.* 1932. Dec. 31. Vol. 3. No. 4. pp. 492–500 (36–44). With 15 figs. on 2 plates. [17 refs.]

On examining a wild rat (*Mus norvegicus*) which was caught near pig sties and had been sent to the laboratory in Keijo the author found it to be infected with a Balantidium indistinguishable from *Bal. coli* of man. It occurred in the large intestine, caecum and lower part of the small intestine. Macroscopically the intestine appeared normal but in sections invasion of the mucosa and submucosa of the caecum was revealed. The organism was successfully cultivated for many generations in a medium consisting of Fränkel's medium and horse serum which had been used successfully by TANABE and KOMADA for the cultivation of *Bal. coli.* *C. M. W.*

MONIER (H.) & DANG-TEH-TRINH. Note sur un infusoire parasite et pathogène. [**A Pathogenic Infusorian.**]—*Bull. Soc. Path. Exot.* 1932. Dec. 14. Vol. 25. No. 10. pp. 1049–1053. With 2 figs.

In the stools of an Annamite child admitted to the Vientiane hospital for dysentery a ciliate was discovered. It was pear shaped, had an antero-lateral tuft of cilia leading from a cytostome and measured 15 μ to 40 μ in length. Encysted forms 7 μ to 15 μ in length were said to be present. It is not clear on how many occasions the ciliate was observed, and though the author would place it in the genus *Nyctotherus,* the figures and description hardly give the details necessary for an accurate identification. *C. M. W.*

KNOWLES (R.) & BASU (B. C.). **The Nature of the So-Called 'Black Spores' of Ross in Malaria-transmitting Mosquitoes.**—*Indian Jl. Med. Res.* 1933. Jan. Vol. 20. No. 3. pp. 757–776. With 4 plates [33 refs.]

The authors again raise the question of the nature of the " black spores " of Ross upon which BRUCE MAYNE wrote so fully in 1929, concluding that they had nothing to do with malarial oocysts but were due to thickening and fragmentation of tracheal tubules (this *Bulletin,* Vol. 27, p. 273).

They speak of the doubt which still exists and account for it by supposing that under the name " black spore " at least three different structures have been confused. These are degenerated and hyperpigmented malarial oocysts, " chitin corpuscles " or thickenings of the tracheal system, and fungus infections of the tracheal system. The second are the structures studied by BRUCE MAYNE but the first alone are true " black spores " of Ross. The authors illustrate what they conclude is the evolution of the " black spore " from malarial oocysts in the wall of the midgut of *Anopheles stephensi* but it must be admitted that their fully developed " black spore " does not bear much resemblance to Ross's illustration which they reproduce. *C. M. W.*

LWOFF (A.). Existence d'une Bartonellose aiguë des souris non splénectomisées. Autonomie d'*Eperythrozoon noguchii* Lwoff et Vaucel. (Réponse aux critiques de M. W. Kikuth et remarques sur l'étiologie de la fièvre de Oroya.) [**Acute Bartonellosis of Intact Mice.**]—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 397–401.

As a result of the author's studies conducted alone or in conjunction with others, two strains of *Bartonella muris* were isolated. The one appeared spontaneously in a mouse infected with *Trypanosoma cruzi*, and the other in a splenectomized mouse infected with *Eperythrozoon*. The two races were morphologically identical, but the spontaneous virus produced in normal mice massive infections, whereas the other did so only in splenectomized mice. VAUCEL moreover demonstrated that recovery from the one infection did not leave immunity against the other.

In a recent article KIKUTH doubts if the spontaneous virus, which is culturable in blood media, is actually a *Bartonella*. He suggests some bacterial infection. Again having observed rounded or coccal forms of *Bartonella canis* he takes exception to the author's and VAUCEL's view that the microphotographs published by NOGUCHI to illustrate *Bartonella bacilliformis* in the blood of the monkey show not only this parasite but another, overlooked by NOGUCHI, an *Eperythrozoon* which they named *E. noguchii*, and suggested might be the actual cause of Oroya fever. This disease they regard as quite distinct from verruga which is caused by *B. bacilliformis*. They conjecture that the two viruses often coexist in the same patient and that in consequence the two conditions, verruga and oroya fever, have been regarded as two phases of one disease. The author replies at length to KIKUTH's criticism and attempts to establish his position by a series of ingenious arguments which in some cases at least are based on analogy rather than on experimental data. *C. M. W.*

FRANCHINI (J.). Balantidiose humaine.—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 175–178. [Italian version has been reviewed.]

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YAWS AND SYPHILIS. TWO DISEASES OR ONE? *

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The discussion as to the identity or otherwise of yaws and syphilis has for long been rather of academic interest; recent developments in the treatment of yaws have, however, given a fresh and practical impulse to the subject. By modern methods it is possible to get rid of the secondary eruption of yaws easily and rapidly; now, if yaws is in fact a condition which is closely analogous to syphilis, there appear to be two eventualities to consider in regard to its treatment. Firstly an inadequate treatment, which caused the disappearance of the skin eruption while not destroying the infection in the body, might result in a neurotropic effect, so that the nervous system might become seriously involved. Secondly, an adequate but premature treatment, by which the spirochaetes throughout the body were entirely destroyed, might lead to a different, but no less important sequel. The important experiments of Sellards and Goodpasture (1923) suggest clearly the nature of the problems involved. These authors record that they treated with neosalvarsan four patients who had had yaws for three months, eight months, one year and two years, and whose Wassermann test was positive; six months later all four, now Wassermann negative, were inoculated with yaws material; the case with yaws for only three months at the time of treatment developed typical granulomata, the eight-months case showed slow growing granulomata which spontaneously regressed; the other two cases developed abortive lesions which disappeared promptly. The authors concluded that active immunity develops in yaws late in the secondary stage.

If yaws infection is capable of protecting against venereal syphilis, then by curing the yaws of children prematurely we are presumably removing their immunity against subsequent syphilitic venereal infection. The prevention of yaws infection in childhood or its cure by successful treatment may thus be a serious step unless the danger of venereal infection later can be obviated. It is not that syphilis in itself, and in its sequelae as it affects the individual, is any worse than yaws, but because of the congenital infection which occurs when the spirochaetal attack is postponed to the marriageable age. Transplacental transmission, with resulting intrauterine deaths, premature stillbirths and congenital infection introduces the possibility of grave racial deterioration.

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* Professor Blacklock questions the soundness of much of the current beliefs about yaws and its relation to syphilis His arguments will doubtless receive open-minded attention.—Ed.

No one disputes the fact that there are striking differences between yaws in the tropics and venereal syphilis in Europe; facility in pronouncing a case of yaws to be yaws, however, does not affect the real question at issue, which is, whether or not yaws may be a form of syphilis. With regard to this question we must finally come to some conclusion as to what basis is to be adopted for our evidence. Given that the morphological characters and staining reactions of the parasites found are identical and that in addition the serological and therapeutical tests in those affected are similar, are we entitled to say that therefore yaws and syphilis are due to the same cause? Or can we deliberately set aside all these tests as completely valueless in favour of certain other tests which we accept as proving that yaws and syphilis are due to different causes? If we do, then it is not unnatural that we should be asked for details as to what these certain other tests are, and that we should be expected to put forward for each one convincing proof of its reliability.

A serologist in England carrying out the Wassermann test is prone to interpret a positive reaction as evidence that the patient's serum contains syphilitic antibody. If the patient were then stated not to have syphilis but leprosy, evidence of this would be expected, *e.g.*, demonstration of *Mycobacterium leprae* or, failing that, clinical evidence of a convincing kind plus the fact, as shown by GOODPASTURE (1923), that antisyphilitic treatment administered to the leper failed to render the blood test negative; should malaria be adduced as producing the positive blood result, evidence of the presence of malaria parasites would be required. If, however, yaws were stated to be the cause of the positive reaction what evidence could be produced in favour of this assertion? Not the parasite, because both by dark ground examination and staining tests the serologist, finding *S. pallida*, would fail to be convinced Nor would a therapeutic test by arsenic be a likely means of differentiating this blood-positive case as yaws to his satisfaction. What then are the tests which are to convince the serologist that he was wrong in declaring this to be a syphilitic serological reaction? The answer is in the tabular statements to be found in most text-books which deal with yaws, and one of these we may now consider.

1. *Yaws*: *not congenital.* *Syphilis*: *congenital.*

We may accept as admitted, by some observers, that there is a little evidence that yaws infection is transmitted to the foetus *in utero.*

Now let us look at the opposed statement, namely, that syphilis *is* congenital, and consider in how far this is true. Syphilis is not the name of a single and uniform clinical entity; on the contrary, it presents so many forms that it is usually divided into several distinct clinical categories. We may select a main division of syphilis into two groups, namely, (1) syphilis venereally acquired, with or without chancre, and (2) syphilis acquired non-venereally. This second group may be further subdivided into :—

(*a*) Adult syphilis, with extragenital primary sore.

(*b*) The syphilis of early childhood with extragenital, or more rarely, with genital primary sore.

(*c*) Congenital syphilis with no primary sore, either genital or extragenital.

With regard to our first main division, namely, venereally acquired syphilis, the statement that it is congenital may be admissible, but only if we qualify it by a series of reservations, to the effect that transmission to the partner in marriage does not occur inevitably in venereally acquired syphilis, that the infected mother may not transmit the disease to her child, that the lapse of even a moderate time from the date of infection of the mother may greatly diminish the chances of its being transmitted transplacentally, that it may be transmitted by her quite irregularly, not to one child but to the next, and that it may even be transmitted to one and not to the other of twins. When we endeavour to ascertain in what percentage of venereally acquired syphilis the disease will be passed transplacentally to the foetus, we obtain figures which are sometimes surprisingly low. A recent figure by ABRAHAM (1932) is 14·1 per cent. of congenital children in a series of births from ninety-two Wassermann positive women.

Our second main division, namely, syphilis acquired non-venereally, has for its first sub-division that of adult syphilis with extragenital primary sore, and for its second the syphilis of early childhood with extragenital or, more rarely, genital primary sore. For neither of these two groups have I been able to find adequate figures which are of assistance to us in trying to decide whether such forms of syphilis are commonly transmitted to the foetus.

As regards our third subdivision, namely, congenital syphilis, the case is different ; there are numerous observations, and they, with few exceptions go to show that this form of syphilis can rarely be transmitted to the offspring. Whereas MCCRAE (1930) states : " The disease can be carried through as many generations as are able to produce " , HUTCHINSON (1909) had said : " As to inheritance in the third generation, I am absolutely incredulous." THOMSON (1925) remarks, " The transmission of syphilis to a third generation must be extremely rare, but we have it on the high authority of F. W. MOTT that it does, sometimes, occur." STOKES (1927) states that " A healthy child of a heredosyphilitic parent is the overwhelming rule." FINDLAY (1919) goes further and affirms : " There is no reputed example of transmission even to the third generation. Like other infectious diseases, it is a pure accident of its environment that the child becomes infected *in utero*."

NABARRO (1933), however, has produced evidence which adds greatly to knowledge of third generation syphilis ; he has personal records of sixteen families with syphilis in three generations. Of particular interest in relation to the present topic is the means, apart from the Wassermann reaction, by which the syphilis in the congenitally affected *mothers* was diagnosed or suspected.

In the addendum of cases to his paper it will be found that there were, out of the first sixteen records : one congenitally infected mother with depressed bridge of the nose and looks c.s. ; one with typical c.s. facies ;

one with incisor teeth pegged and notched and history of interstitial keratitis; one with Hutchinsonian teeth, corneal opacities and history of interstitial keratitis; one with rhagades about mouth and joint scars; one in which there were no stigmata but a history of snuffles in infancy; one which had no syphilitic history or stigmata other than deafness; one with teeth very suspicious; one with some narrowing of the incisors; one with barrel-shaped upper incisors; one with left upper incisor notched and suggestive and six-year old molars mulberry-like; one with bossed forehead and R lower canine notched; and four in whom there was no history of syphilis and no stigmata.

NABARRO appears justified in saying " I have now learned to detect finer points in diagnosis "; it certainly seems improbable that less experienced persons would see in the great majority of these proved congenital mothers any indication for suspecting congenital syphilis and having a Wassermann or Kahn test performed. The conditions of work in yaws areas render the initial detection of such cases and their final diagnosis infinitely more unlikely, one might almost say, highly improbable.

HUDSON (1932–3) who is making a study of syphilis (bejel) among Euphrates Arabs makes reference to LACAPÈRE'S work among Moroccans and records his own observations in the Syrian desert on the Middle Euphrates. " LACAPÈRE (p. 271) thinks that congenital infection is very common in the Moroccan Arab, 60 per cent. of young Moroccans presenting undoubted marks of congenital syphilis. Our observation of the infants and children of Deir-ez-Zor leads us to the opposite conclusion." He records also that among this population, with a minimum infection of over 50 per cent. as ascertained by Kahn test, keratitis, nerve deafness and notched teeth are rarely, if ever, seen.

Reverting now to the original statement about yaws and syphilis, it seems to be a fallacy to compare the non-venereal disease of childhood, called yaws, with syphilis in general. We ought at least to refrain from comparing it with venereally acquired syphilis; the comparison should be limited to those forms of syphilis which are non-venereal and which occur in children, namely, the acquired syphilis of early childhood and congenital (transplacentally acquired) syphilis. Since we can discover no sufficient figures as regards the outcome for the acquired form of early childhood, we are driven back to the congenital form as the best available, with which we can reasonably and properly compare yaws. Putting the conclusions we have come to, instead of the textbook antithesis with which we began, namely, yaws never congenital, syphilis congenital, the statement which we now have in its place, accepting fully NABARRO'S figures, is this:—*In yaws: congenital transmission very rarely recorded. In congenital syphilis (and probably in infantile acquired syphilis): congenital transmission rarely recorded.*

Let us next take a group of boys and girls aged eight, with yaws, and assume that yaws, acquired at the age of eight, will normally act in the same way as venereal syphilis would act if it had been acquired at that age. What then should we expect to find as regards its transmission later to the child *in utero*? Should we expect that it ought to be transmitted by the mother at the age of fifteen or sixteen to her child? Even on the too severe analogy of venereally acquired syphilis, I believe we should expect such transmission to be rare. Taking first the males of our eight-year-old group, when they reach the age of marriage they will not be able to infect the females of this group, because the females will be already immune; neither will they be able to infect non-immune females, because they themselves, the males, will already have usually passed the infective stage, since the lapse of time factor is of paramount importance even in cases where venereally acquired syphilis is concerned. Thus HARRISON (1931) says : " It is generally agreed that the risk of infection by sexual intercourse becomes very considerably reduced by the end of the second year of infection, and is very slight after five years, though exceptional cases of much longer sexual infectivity have been published. The effect of this is that, on the score of contagion, there is practically no bar to marriage by a syphilitic man after five years."

STOKES says : " Time diminishes the infectiousness of syphilis. After five years few cases are infectious." The same author notes that KEYES placed the chance of infection by the untreated husband as 12 to 1 the first year, 5 to 2 the second year, 1 to 4 the third year, and practically nil the fourth and fifth years.

There is a mass of evidence of this nature, the general trend of which is to show that after the first years of the infection, the chances of even the venereally infected male passing on syphilis to the female, decline with great rapidity ; and yaws cases are rarely venereally infected.

Turning now to the females of our eight-year-old group, on marriage they could not infect the immune males, and we should expect to find, owing to the lapse of time, a similar falling off of their chances of infecting non-immune males. But it may be argued that such an infected female might still, though not capable of infecting a non-immune male venereally, be capable of passing on the infection transplacentally to her foetus. On this aspect the evidence points rather to the contrary ; HARRISON states : " The transmissibility of the disease certainly becomes less with the age of the mother's infection ; thus Belding found that women with infections of more than five years' duration seldom give birth to syphilitic infants." LEES's (1927) evidence on this point is similar, " If the parents suffer from untreated syphilis, the virulence of transmission is always most potent during the first year of infection. It lessens subsequent to this, and a living but weak syphilitic child may be carried to term. By the fifth or sixth years the virulence of transmission slowly lessens, and in many such cases syphilis is no longer transmitted."

Therefore, I would suggest firstly, that the available evidence is altogether against the probability of children who acquired syphilis at this age being able to transmit it commonly to the child *in utero* later, and secondly, that in this respect yaws is like syphilis.

We come now to the infinitely more limited number of women who acquire yaws at adult age. The native mother who, having escaped infection in her youth, acquires the disease from her child, would nevertheless, at first sight, appear to be now in a good position to transmit the disease at her next pregnancy. If the next pregnancy were in a year's time, it is probable that she might do so, but in fact her next pregnancy, if there is one, may, among many native tribes, not be in the next year nor yet in the year after that, owing to the tribal customs and regulations in regard to this matter ; here again the lapse of time factor in transmission comes into operation, so that her chance of transmitting would, on the analogy of venereal syphilis, be much diminished by the time her next child was *in utero*.

It will be seen therefore, that the search for instances of congenital transmission of yaws is likely to be rewarded by success among a very limited number of exceptional females, if they are reared in yaws endemic areas; it is thus not difficult to understand that such transmission may be a fact, and that it may be occurring in all of those few cases in which it is actually possible, and yet very rarely be recorded. A failure to encounter frequently a case of transplacental transmission in yaws need therefore hardly surprise us; we are looking for a condition which a study of the epidemiology of the disease proves to us must be rare. The fact that we have not found it cannot be regarded as justifying us in denying the actual occurrence of transmission of yaws from the mother to the child; still less does it justify our making the assumption that such congenital transmission is impossible in yaws.

The arguments in this section have by some, *e.g.*, VAN NITSEN (1933), been interpreted as intended to prove that yaws is, in fact, congenitally transmitted; they were not intended to prove more than that we do not yet know whether it is so transmitted or not. If, moreover, we were in a position to affirm now, absolutely, that yaws is *never* transmitted transplacentally, and we are far from that position yet, it would even then be inadmissible to proceed direct to the conclusion that yaws and syphilis are different diseases, due to different parasites; it would be incumbent upon us to prove that this lack of placenta-passing capacity was inexplicable on any other grounds such as race, climate, epidemiology and general environment. VAN NITSEN cites and formally tabulates a single case of Dr. MATTLET'S, "*observation d'un intérêt capital*" to prove that yaws is not transmitted transplacentally. The mother, in full yaws eruption, gave birth to a healthy child; the proof given of non-transmission is the Wassermann++ in the mother and 0 in the child, both tested ten days after the birth. Now this observer may be perfectly correct in saying that the child did not inherit yaws, but he omits to prove it; he fails to mention two facts on which syphilologists are fairly well agreed: first that a congenital syphilitic child may not become Wassermann-positive till much later than ten days after birth, and second, that no one would accept a single negative test as sufficient to exclude syphilis, whether in a child of ten days or anyone else.

II. *Yaws*: *primary sore extragenital.* *Syphilis*: *primary sore usually genital.*

LACAPÈRE (1932) points out that among natives, syphilitic venereal chancres are rarely seen, and that the great number of the primary lesions are extragenital. It is of interest to note what this writer calls the three great characters of the syphilitic chancre among natives: "Il est ordinairement méconnu, son siège est souvent *extragénital* et il se rencontre fréquemment chez l'enfant."

HUDSON has never seen a venereal chancre among the thousands of patients he has examined in the Arab endemic-syphilis area referred to previously.

The extragenital site of the primary lesion of yaws has, therefore, no value as a differential point, by which to distinguish yaws from syphilis.

III. *Yaws*: *typical yaw pathognomonic, furfuraceous and plantar lesions characteristic.* *Syphilis*: *seldom imitates framboesia.*

The diversity of the lesions of the primary and secondary stages of yaws have been emphasized from the early times. MAXWELL (1839) wrote: "It is well known that the whole children on a plantation may be inoculated from a favourable case of yaws, and that the disease will present as many shades of difference as there are peculiarities among the persons affected." The early experiments of CHARLOUIS (1881) and others bring out the great variations which may occur, and recent experimental workers like SELLARDS, LACY and SCHÖBL (1926) have also shown this.

There are, further, certain observations which prove that even in venereal syphilis important differences exist in the secondary eruption as between the white and the coloured patient, even when the latter is civilized and wears clothes. STOKES points out that the annular secondary syphilide, a form of eruption relatively rare in white patients, is very common in the American negro.

HAZEN (1914) mentions five varieties of syphilides seen among American negroes much more commonly than in other races in America. "The first is the follicular variety, in which the lesions are very small, and situated at the hair follicles; the second is the annular kind . . . the third is the frambesiform. . . ."

ZIMMERMANN (1921) points out that his observation confirms FOX, GILCHRIST and HAZEN in regarding the annular papular syphilide as a most striking peculiarity in negro syphilis. GOURLEY (1924), in describing venereal diseases among Indian women and speaking of the types of secondary eruption says: "One, the papulo-pustular type needs special mention. It is not infrequently so pustular as to make one stand back and enquire about the possibility of *smallpox*." These and similar observations suggest that we should find even greater differences under more primitive conditions of life; it is necessary therefore to study the eruption of secondary syphilis in native children with extragenital chancre and living unclothed in similar rural areas, in order to obtain a just comparison with yaws.

The furfuraceous lesions are probably thus emphasized because they look more conspicuous on the native skin, where the branny scales are seen against a dark background.

The differential point about the lesions of the feet, is one which should be taken in conjunction with a consideration of the effects of pressure and injury, in causing localization of a syphilitic eruption. TAYLOR (1930) notes that in all stages of syphilis there is a tendency for the lesions to appear at sites of injury, *e.g.*, mucous patches and glossitis of smokers, squamous syphilides on palms of manual workers, gumma of frontal bones of Mohammedans—from striking forehead during worship. For the same reason that the forehead of the syphilitic Mohammedan shows lesions not to be found in non-Mohammedan, it is probable that the lesions of the bare feet of the syphilitic native will differ from those of a well-shod European adult.

IV. *Yaws: mucous membranes not affected. Syphilis: mucous membranes affected.*

As regards the yaws side of this statement, MAXWELL long ago expressed his disagreement with it in the following remarks on the eruption of yaws:—" Mr. Mason, who writes a sensible Essay on yaws, has fallen into error in supposing 'the mucous tissues incapable of producing yaws tubercle'." CHARLOUIS described confluent tubercles in the nostril, on the septum, ala and floor. We have also the observation of HUTCHINSON that while he was in Ceylon he found, in cases produced as typical parangi, that there were present symmetrical filmy sores on the tonsils just like those of syphilis. In more recent times we may quote from CASTELLANI (1922) writing of lesions of the mucous membranes : " These are not very common, but small granulomatous nodules may develop at the base of the tongue, as may whitish patches like syphilis leukoplakia. Small granulomata may form on the nasal mucous membrane, and also on that of the vagina." CALLANAN (1925) records secondary lesions on the tongue.

Turning now to the other side of the statement, namely, *Syphilis : mucous membranes affected*, HUTCHINSON says that mucous patches are very often superficial and almost painless, MACLEOD (1920) states that erosions of mucous patches do not as a rule give rise to subjective symptoms and both he and STOKES emphasize the importance of mouth irritants such as alcohol and tobacco in producing and perpetuating such lesions.

ZIMMERMANN, it may be noted, found secondary lesions in the mouth and pharynx to occur in 42·1 per cent. of white patients, as compared with 27·2 of the negro patients in his series of cases. He refers to the mutually contradictory statements of HAZEN and BAETZ on this subject, and also to the observations of CARTER, who did not observe a single mucous patch in two hundred and thirty-one coloured syphilitics, while such lesions occurred in twenty-one of a similar number of white patients. It appears probable that, if there is a smaller percentage among adult negroes than among adult whites, the reason may be sought partly in a relative absence of causes of injury and irritation of the mucous membranes in negro patients.

If we admit that mucous membrane lesions of the mouth are determined by irritants, we should not expect such lesions to be common in yaws children because these are not subjected to such irritations of the mouth, as tobacco and alcohol, which are recognized by all syphilologists as especially predisposing to lesions of the mucous membranes of the mouth.

The evidence thus shows that it is not correct to say that in secondary yaws the mucous membranes are not affected, and that it is equally incorrect to suggest that the mucous membranes are always affected even in secondary venereally acquired syphilis. If we are seeking to institute a comparison between yaws and syphilis, we require to know how the mucous membranes are affected in native children of the tropics who acquire syphilis with an extragenital chancre. Such a group would appear to be the only fair one for comparing syphilis with yaws in children.

V. *Yaws : itching common. Syphilis : itching rare.*

VI. *Yaws : alopecia not known. Syphilis ; alopecia may occur.*

Such evidence as exists on these points is contradictory and hardly of use in diagnosis.

VII. *Yaws : eyes unaffected. Syphilis : iritis common, choroiditis and retinitis rare.*

The iritis incidence presents anomalies for which the explanation does not appear obvious. As far as yaws is concerned, some cases have been recorded from endemic areas ; even among the Fijians, who were not supposed to suffer from syphilis, there is recorded the occurrence of occasional cases.

As regards its frequency in syphilis, there are various statements ; thus HUTCHINSON says at one time that iritis is fairly common, but later says that he had not seen a case for several years. He states : " When the secondary eruption is at its height, or just when it begins to decline, there occurs in exceptional cases an inflammation of the eye, the iritis, when it happens, is usually symmetrical " McCRAE says iritis is common in syphilis three to six months after the chancre STOKES, however, writes " Iritis is usually a late secondary, the incidence in our series did not exceed 3 per cent. in the general run of cases, it seems to be more frequently an accompaniment of severe infection " ZIMMERMANN found only four cases of iritis among two hundred and twenty-eight cases of white patients with early secondary syphilis, whereas there were thirty-six cases of acute iritis among two hundred and seventy-nine black patients, and he notes that in seventeen of them it was associated with follicular syphilides He states that ATKINSON found eleven cases of iritis among one hundred negroes with primary and secondary syphilis In the tertiary stage he found the negro more prone to iritis than the white, of forty cases in which this occurred as an isolated lesion, or in association with other tertiary lesions, twenty-nine were coloured patients It is possible that further study of iritis in natives in their own countries may throw light on this question.

Up to the present, among primitive yaws populations, there has been relatively little ophthalmic investigation.

VIII. *Yaws: visceral lesions absent. Syphilis: visceral lesions occur,* i.e., *pericellular cirrhosis, gumma of liver and kidneys, etc.*

LACAPÈRE, in summing up the differences which distinguish the syphilis of natives of the French Colonies both in the Far East and in North Africa from European syphilis, says that one of the characteristics of the former is the great rarity of visceral lesions. GOUGEROT (1932) discusses the peculiar evolution of colonial native syphilis, and he too emphasizes the rarity of visceral lesions in this native syphilis. GLÜCK (1904) studied endemic syphilis in Bosnia and Herzogovina, where there was a great tendency to extragenital infection during infancy and childhood; he noted as one of the peculiar characters of this type of syphilis that there was comparative infrequency of visceral syphilis.

Now if we permit ourselves to use the absence of visceral lesions in yaws as a fact which entitles us to declare that yaws and syphilis are different diseases, we encounter a difficulty. We cannot argue in this way without admitting that the endemic syphilis of Bosnia and Herzegovina, where children acquire the diseases by extragenital chancre, and also the colonial syphilis of the French, and that of the Arabs of the Euphrates described by HUDSON, are equally not syphilis. But, as we shall see, all the evidence obtained from the observation of Europeans who have contracted syphilis from natives in the tropics, goes to prove that the colonial syphilis is not to be distinguished in any way in its effects on these Europeans, from syphilis contracted venereally from Europeans.

Yaws, as regards its visceral lesions, ought properly to be compared with syphilis in the tropics occurring among children who have acquired it by extragenital chancre, and the evidence suggests that, when this is done, little difference may be found.

IX. *Yaws: nervous system never seriously affected. Syphilis: nervous system prone to infection, tabes, G.P.I.*

Very different figures are given by various observers of the incidence of tabes and paresis in European syphilis.

There are numerous records which suggest strongly that occupation, race and the character of the secondary eruption, are some of the factors which determine the incidence of these two sequelae of syphilis. OSLER and MCCRAE (1928) pointed out that the civilized peoples are those who get paresis, and further, that it affects men much more frequently than women. LACAPÈRE, in Morocco, considers it probable that it is what he calls " intellectual trauma " which determines paresis in educated Europeans. The evidence of STOKES, MOORE (1921) and ZIMMERMANN goes to prove that American negroes suffer much less from neurosyphilis than do whites ; STOKES writes : " The now well established clinical observation that patients who develop marked cutaneous symptoms are relatively immune from neurosyphilis . . . "; HARRISON (1931a) refers to the same phenomenon in discussing treatment.

Having seen that the three factors, occupation, race and character of the eruption, appear to have importance in relation to the development of paresis and tabes, let us turn from syphilis as it occurs among Europeans, Americans and American negroes, and consider it as it occurs among native peoples in their own lands.

The figures as regards paresis and tabes in syphilis in the natives of tropical and subtropical countries are remarkable. BAETZ (1914) did not find a case of tabes and only one case of paresis in twenty thousand admissions of negroes in the Canal Zone. FLETCHER (1922), who worked in Malay, says that it is the experience of most writers in the tropics, that symptoms of early involvement of the nervous system are uncommon in natives, and that tabes and general paralysis are comparatively rare, at any rate among the native population. HARPER-NELSON (1931) records that in Lahore, during twelve years in charge of sixty medical beds, he saw only two cases of tabes dorsalis and that one of these had European blood, and only one case of G.P.I., and that an Anglo-Indian. Of particular interest in relation to this question are the Uganda figures, because there, among the Baganda people, syphilis is said to be very rife, and congenital syphilis to constitute a grave problem. COOK (1931) says : " In Uganda it has been an amazing thing to me to see how few cases there were of locomotor ataxy and dementia paralytica. I have always tried to take a careful interest in nerve syphilis. I must have seen considerably over one hundred thousand cases of syphilis, but I do not remember seeing a single case of locomotor ataxy or G.P.I. in Uganda." COIA (1931) states that in British Guiana, with one hundred thousand negroes and one hundred thousand Indian immigrants, there have been in ten years two cases of G.P.I. and one of tabes. DECROP (1932) found only two cases of tabes and two of G.P.I. in five years among eighty-four thousand syphilitics in Tangiers.

LEVADITI and MARIE (1914) explain this fact, which has impressed so many observers, as due to difference in strain, suggesting that the *Spirochaeta pallida* producing general paralysis differs biologically from that of cutaneous and mucous syphilis ; they call the former the neurotropic variety ; but the evidence of FLETCHER, COOK, HARRISON and others as regards the effects on Europeans does not lend support to this explanation. LACAPÈRE cites three hundred and forty-three cases of Europeans who contracted syphilis from native women in the French African Colonies ; in all these the syphilitic infection behaved just as it does in cases contracted in France.

From the above records it is clearly impossible to distinguish yaws from syphilis as it affects natives of the tropics by the tabes and G.P.I.

incidence. Yet, as noted, the clinical evidence points to syphilis in natives of the tropics being the same disease as that of Europeans and due to the same spirochaete.

X. *Yaws: no endothelial proliferation as in syphilis. Syphilis: endarteritis obliterans of viscera, cerebral thrombosis.*

Since in some yaws endemic areas where venereal infection rarely appears to be present, aortitis, aneurysm and various plegias are yet common, we must either conclude that these lesions have a different pathology from those of syphilis, or else admit that in yaws, just as in syphilis, endarteritis and thrombosis occur.

A further point to be considered while dealing with this question of endothelial proliferation is the histopathology of the gumma. Gummatous lesions of the skin and subcutaneous tissues are usually held to be very numerous in yaws endemic areas. The gumma of syphilis is considered by most observers to involve endarteritis as a precursor of necrosis. MALLORY (1925) says the term "gumma" in syphilis is practically restricted to those tertiary lesions in which necrosis has taken place as a result of obliterating endarteritis. STOKES writes of the cutaneous syphilitic gumma: "In the pathology of these lesions one sees the granuloma of syphilis most typically portrayed—giant cells, the lymphocytic infiltration, some epithelioid and fibroblastic proliferation, peripheral obliterative, endarteritis of the finer capillaries and arterioles, and central softening and necrosis."

If we accept the general testimony that gumma of the skin and subcutaneous tissue is common in yaws, then we are obliged either to admit that obliterative endarteritis does in fact frequently occur in yaws, or else to postulate that the histopathology of the cutaneous gumma of yaws is entirely different from that of the cutaneous gumma of syphilis.

XI. *Yaws: better resisted, constitutional disturbances slight. Syphilis: attacks constitution, affecting vital structures.*

It is difficult to understand the significance of this statement. The primary lesion of syphilis is in itself commonly a much less troublesome lesion than that of yaws. Most observers will consider the secondary stage of yaws, with its precursor malaise, bone pains and general symptoms, to be at least as constitutionally incapacitating as this stage of syphilis. As for the tertiary stage, a great many people will agree with BRANCH (1907) when he says that if syphilis and yaws are different diseases, then yaws is the worse of the two.

If it is the grave effects on the nervous system, *e.g.*, tabes and general paresis, which are meant by the phrase "affecting vital structures," the reader may refer to heading IX where these nervous system lesions are discussed, and where it is shown that the rarity of these affections in yaws does not distinguish it from syphilis among natives of the tropics. Again, if it is the effects on the viscera which are meant, the reader may be referred to the argument under heading VIII where it is shown that the reported lack of visceral lesions in yaws is paralleled by the reported lack of visceral lesions in syphilis in natives of the tropics. Finally, if the vital structures are the blood-vascular system, changes in which cause the lesions which result in paraplegia, hemiplegia and other plegias, reference to them will be found under heading X where it is noted that such lesions are common in yaws endemic areas.

XII. *Yaws: does not respond to mercury. Syphilis: responds well to mercury.*

There is evidence from the earliest times which shows that mercury benefits yaws, just as there is evidence that the results of mercury treatment of syphilis may be extremely disappointing.

There does not appear to be a single manifestation of yaws which has not been reported by one observer or another in syphilis, so that the tabulations break down at various points. In rejecting any or all of the differential items we must avoid replacing them by others equally fallacious. The introduction of such expressions as yaws ectodermotropic, syphilis mesodermotropic seems hardly likely to clarify the subject. A pathogenic organism may change the site of its activities in the animal body with some suddenness and for reasons little understood as yet. For example FINKELSTEIN and ORLOW (1931) record that spirochaetes of syphilis inoculated intravenously into rabbits passed the placenta and caused foetal infection, whereas by other methods of inoculation they failed to do so. A further instance is available; RAIZISS and SEVERAC (1932) record that Nicholl's strain of *Spirochaeta pallida* carried on in the rabbit did not infect the animal's brain; when injected into mice it reached the brain of mice though producing an entirely asymptomatic infection: after this passage through mice the spirochaete had acquired and retained the capacity of reaching and infecting the brain of rabbits when inoculated in the usual way; it had thus acquired neurotropic properties. Without the use of animal experiments we have evidence of even more direct "tropism." STOKES reports a family of four persons all infected with the same strain of spirochaete: the father and one son had highly resistant neurosyphilis, while the mother and other son had quiescent benign infections. It is difficult to understand how syphilitic spirochaetes which show such predilection for the nervous system, as in two of these cases, can be classified as mesodermotropic.

In conclusion it seems reasonable in our present state of knowledge, without claiming that any final scientific proof of unicity exists, to take the morphology, staining, serological and therapeutic tests as pointing to yaws and syphilis being due to the same organism; on this basis we expect much more convincing arguments than those tabulated, before rejecting the evidence of these tests.

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KALA AZAR.

GIMENO ONDOVILLA (Antonio). Contribución a la epidemiología del kala azar. [**The Epidemiology of Kala Azar.**]—*Trabajos.* Madrid. 1933. Mar. 31. Vol. 2. No. 12. pp. 26–27. With 1 fig.

Seven cases of kala azar have been observed by the author in Spain in 1932. Two cases in children were from Madrid and five cases, of which one was in an adult 27 years of age, were seen in Seville. In this town two of the patients were in one house, another in an adjoining one, while the other two were not distant more than 30 and 60 metres respectively. This quarter of the town was a particularly insanitary one. In the houses of four of the patients dogs lived. An examination of 76 dogs from the district revealed leishmania infection in 5, while of 495 cats examined one is said to have been infected, the parasites, however, being extremely rare. [If this statement regarding the cat is accepted, the record is the second of naturally occurring kala azar in this animal, the first having been made in 1912 in Algeria by SERGENT Ed. & Et., LOMBARD & QUILICHINI.] *C. M. Wenyon.*

OLMER (D.) & OLMER (Jean). Quelques remarques sur le kala-azar autochtone de l'adulte. [**Indigenous Kala Azar in France.**]—*Marseille-Méd.* 1933. Mar. 5. Vol. 70. No. 7. pp. 341–348. [16 refs.]

It is becoming increasingly evident that kala azar may be acquired by adults in the South of France as well as by children. The authors mention the records of a number of cases and, for the use of local medical men, give a brief account of the methods employed for arriving at a diagnosis. *C. M. W.*

D'OELSNITZ. La pigmentation et le " masque " du kala-azar autochtone de l'adulte. [**Pigmentation in Kala Azar in France.**]—*Bull. Acad. Méd.* 1933. July 4. 97th Year. 3rd Ser. Vol. 110. No. 26. pp. 35–37.

The author has had experience of about 60 cases of kala azar in children in the South of France and of 8 cases in adults of which 5 were undoubtedly autochthonous cases. In this paper attention is drawn to the fact that pigmentation of the skin never occurs in children while it does in adults, thus justifying the term kala azar. The distribution of the pigment on exposed parts of the body and its butterfly distribution on the face are emphasized. On unexposed parts the natural pigmentation of certain areas is intensified. Of the 8 adult cases one showed no pigmentation. *C. M. W.*

FABRI (Giuseppe). Osservazioni sopra un caso di leishmaniosi ribelle alle cure e guarito dopo aver superato una infezione tifica. [**An Obstinate Case of Kala Azar clearing up after an Attack of Typhoid Fever.**]—*Policlinico.* Sez. Prat. 1933. Apr. 10. Vol. 40. No. 15. pp. 563–566. With 3 charts.

A child, six years of age and suffering from kala azar, had failed to respond to treatment with antimony tartrate, 80 centigrams of which had been given, when its condition suddenly became worse. A spleen puncture showed that leishmania were still present. On carrying out a blood culture it was found that the child had contracted typhoid fever from which it recovered in four weeks. At the same time the general condition improved till finally it became evident that the typhoid infection had brought about a cure of the kala azar. *C. M. W.*

WALKER (J. H. C.) & GIBSON (C. C. G.). **Leishmaniasis (Kala-Azar) in an Adult contracted in Malta.**—*Jl. Roy. Army Med. Corps.* 1933. June. Vol. 60. No. 6. pp. 449–454. With 1 fig.

A detailed account of a case of kala azar in a soldier aged 22 in which the disease was undoubtedly contracted in Malta. The case is of interest in that the infection was refractory to neostibosan but responded at once to injections of tartar emetic. During the course of neostibosan which did not check the disease, the patient was treated for a short time with a liver preparation in an attempt to combat the anaemia. There was an immediate red cell response but also a big increase in the white to red cell ratio. On discontinuing the liver preparation there was at once a fall in the number of red cells. *C. M. W.*

SUR (S. N.) & NEOGI (S. K.). **"Novostiburea" in the Treatment of Kala-Azar.**—*Indian Med. Gaz.* 1933. May. Vol. 68. No. 5. pp. 273–275.

The paper records the treatment of 27 cases of kala azar by either intravenous or intramuscular injections of novostiburea. The drug is of low toxicity and can be administered if desired every day. It produces no unpleasant symptoms. In the cases recorded there was rapid cessation of fever and disappearance of symptoms. In 15 cases which completed treatment the average number of injections was 9, while in 4 adult cases the average quantity of drug used was 2·35 gm. In a foot-note to the paper the editor of the journal notes that the drug was tested at the Calcutta School of Tropical Medicine. Its low toxicity was reported upon, but it was found to be less effective than other drugs. *C. M. W.*

GIARDINA (Agostino). La cura della leishmaniosi interna col tartrato di sodio e d'antimonio. [**Treatment of Kala Azar with Sodium Antimony Tartrate.**]—*Riv. Sanitaria Siciliana.* 1932. Dec. 15. Vol. 20. No. 24. pp. 1797–1798, 1801–1804. With 1 chart. [18 refs.] English summary (4 lines).

Since March 1929 there have been treated as outpatients at the children's clinic at Palermo 130 cases of infantile kala azar. The method of treatment has been two intravenous injections a week of a 1 per cent. solution of sodium antimony tartrate. Of the 130 cases, 79 continued the course of treatment to the end and were cured, while the remainder for one reason or another abandoned it. The advantage of being able to treat children as outpatients is obvious. *C. M. W.*

GIMENO ONDOVILLA (Antonio). Contribución al diagnóstico del kala-azar. [**The Diagnosis of Kala Azar.**]—*Trabajos.* Madrid. 1933. Jan. 31. Vol. 2. No. 8. pp. 30–31.

The author concludes, from the study of 7 cases of kala azar in Spain and a number of controls, that the serological reactions for kala azar and the administration of a provocative dose of neostibosan to cause parasites to appear in the blood, are tests which are of value in diagnosis when spleen puncture cannot be performed. *C. M. W.*

D'OELSNITZ & FAURE-BRAC. Le dépistage du kala-azar. [**Diagnosis of Kala Azar.**]—*Bull. Acad. Méd.* 1933. Feb. 28. 97th Year. 3rd Ser. Vol. 109. No. 9. pp. 265–268.

The paper is a discussion of the relative value of the various laboratory procedures which may be applied to the diagnosis of kala azar. Apart from actual discovery of the parasite by spleen, liver or bone puncture the antimony test appears to be the most reliable.

C. M. W.

MATHEWOSSJAN (Sch. T.) & ZATURJAN (A. T.). Experimentelle Infektion des armenischen Hamsters *Cricetulus migratorius* mit *Leishmania donovani*. [**Experimental Infection of** *C. migratorius* **with** *L. donovani*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Apr. Vol. 37. No. 4. pp. 190–193.

In recording the susceptibility to inoculations with *Leishmania donovani* of the Armenian hamster, *Cricetulus migratorius*, the authors note that during recent years, 1928–1932, there had been registered, mostly in Erivan, 85 autochthonous cases of kala azar in human beings and one case in a dog. The hamster in question is a small animal which has the habits of the ordinary house mouse and is found in all the houses of Erivan. Of 32 inoculated with cultures of various ages 15 became infected and of 4 inoculated with the tissue forms of the parasite all were infected. The longest interval between inoculation and examination in a positive case was 128 days. *C. M. W.*

GIRAUD (Paul) & CABASSU (Henri). Sur la valeur des procédés de laboratoire pour le diagnostic de la leishmaniose canine naturelle. [**The Diagnosis of Canine Leishmaniasis.**]—*Ann. Inst. Pasteur.* 1933. Apr. Vol. 50. No. 4. pp. 539–549.

In this article the authors discuss the value of the various procedures for the diagnosis of kala azar as applied to dogs. Apart from the discovery of the parasite, which is most readily done by the examination of smears made from cutaneous lesions, if such occur, or by performing bone puncture to obtain marrow, preferably from the anterior end of a rib, the formol gel reaction gives the most reliable information. In fact the various procedures have much the same values as they have in the diagnosis of the human disease. *C. M. W.*

RIVERA (J.). Nota sobre la leishmaniosis canina en Madrid. [**Canine Leishmaniasis in Madrid.**]—*Trabajos.* Madrid. 1933. Apr. 15. Vol. 2. No. 13. p. 30.

A previous examination of 200 dogs in Madrid in 1914 did not lead to the discovery of a single case of leishmania infection. The examination by the author of a similar number of stray dogs destroyed by the municipal authorities between February 10 and March 20, 1933, has revealed leishmania infection in 11. The general condition of the infected dogs as regards emaciation, skin lesions, and size of the spleen corresponds with what is known of kala azar in these animals.

C. M W.

SARNELLI (Tommaso). Presenza di leishmaniosi mucocutanee sugli altipiani dell'Arabia Sud-Occidentale. (Nota preventiva.) [**Mucocutaneous Leishmaniasis in the Uplands of South-west Arabia.**]—*Arch. Ital. Sci. Med. Colon.* 1933. Mar. 1. Vol. 14. No. 3. pp. 227–228.

At Sana', the capital of the Yemen district of Arabia, where oriental sore is common, the author has seen three cases of mucocutaneous leishmaniasis. In two the nasal mucosa was involved, and in one the labio-oral mucosa. Two cases of recently treated nasal mucosal lesions were also seen. Of kala azar two cases were diagnosed by microscopic examination. One was in a child five years of age and the other in a child of twelve. The author mentions native remedies for the mucocutaneous lesions which he thinks may be efficacious as the terrible tissue destruction, seen in S. American cases, is not seen here. He recognizes, however, that the leishmania of Arabia may be less virulent than that of S. America. [It seems, however, to the reviewer that these relatively slight involvements of the mucosae in endemic centres of oriental sore which are reported from time to time, represent merely extensions of cutaneous lesions and are of quite a different nature to the very serious and lasting disease of S. America.] *C. M. W.*

MUIR (E.) & CHATTERJEE (S. N.). **A Rare Type of Dermal Leishmaniasis.**—*Indian Med. Gaz.* 1933. Apr. Vol. 68. No. 4. pp. 211–212. With 5 figs.

The case described is that of a man with a six years' history of erythematous eruptions with annular lesions, thickening of the skin and nodule formation over the greater part of the body. A persistent diagnosis of leprosy was made, but eventually the condition was found to be due to leishmania infection of the skin. It is significant that about a year before the skin condition commenced on the abdomen the patient suffered from a fever with enlargement of the spleen from which he recovered without treatment. *C. M. W.*

HAYWARD (E. W.). **Notes on Berberine Sulphate in Oriental Sore.**—*Indian Med. Gaz.* 1933. May. Vol. 68. No. 5. p. 265.

This short note gives some details of the treatment with berberine sulphate of between three and four hundred cases of oriental sore in Rajputana. In a fair proportion of the cases leishmania was found, but it is noted that owing to pressure of work it is not possible to search for parasites in every case. The number of injections of berberine sulphate varied, but it appears that all cases which received five or more injections were cured. The records show that the injections are sufficiently painful to drive away a large number of patients, but the treatment, if persisted in, is a certain cure. *C. M. W.*

LAQUEUR (B.). Ueber Chemotherapie der Leishmaniosis cutanea. II. Mitteilung. [**Treatment of Oriental Sore.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Apr. Vol. 37. No. 4. p. 194.

Referring to the method of treatment of oriental sore with camphor ointment (see this *Bulletin*, Vol. 29, p. 873) the author notes that in certain very anaemic patients there is poor response and delayed recovery. In such cases treatment with tonics of arsenic, strychnine and other drugs should be undertaken, while the granulations are stimulated with balsam of Peru or silver nitrate. *C. M. W.*

MORETTI (Egisto) Su di un raro caso di bottone d'oriente unico palpebrale, simulante un epitelioma [**Oriental Sore of the Eyelid.**]—*Riv Sanitaria Siciliana* 1933 Feb 15 Vol 21 No 4 pp 284, 287–290, 293–6, 299 [10 refs] English summary (5 lines)

A record, with a lengthy discussion on differential diagnosis and other matters, of a case of oriental sore of the eyelid in an adult, fifty-five years of age, an inhabitant of Catania *C M W*

MONTFORT (R) Sur un nouveau cas de bouton d'Orient observé à Beni Ounif (Sud oranais) [**Oriental Sore in Beni Ounif (Southern Oran).**]—*Arch Inst Pasteur d'Algérie* 1933 Mar Vol 11 No 1 pp 24–25

In 1932 HORRENBERGER recorded two cases of oriental sore from Beni Ounif in Southern Oran where the disease had not hitherto been noted The author now records the third case from the same place *C M W*

MONACELLI (M) Su di un focolaio di Leishmaniosi cutanea endemica in Abruzzo [**Endemic Focus of Oriental Sore in Abruzzo.**]—*Policlinico* Sez Prat 1933 June 26 Vol 40 No 26 pp 1007–1010 With 5 text figs

A description of a number of cases of oriental sore from certain districts of Abruzzo, demonstrating the endemicity of the disease in the Province of Teramo in Italy *C M W*

GONZALEZ (Senen) & TOSCANO (Juan Mo) Contribución al estudio del kala-azar en la provincia de Jaén [**Kala Azar in the Province of Jaén (Spain).**]—*Medicina Países Cálidos* Madrid 1933 Mar Vol 6 No 2 pp 133–137 [45 refs]

The record of a case of kala azar in a child 18 months old from Castellar de Santisteban in the Spanish Province of Jaén It is noted that since the record of the first case of kala azar from Spain in 1912 cases have been described from all districts of the country *C M W*

D'OELSNITZ & GAUTSCHI Un nouveau cas autochtone de kala-azar de l'adulte rapidement guéri par le traitement stibié [**An Indigenous Case of Kala Azar.**]—*Bull et Mém Soc Méd Hôpit de Paris* 1933 Mar 20 49th Year 3rd Ser No 9 pp 344–348 With 1 fig

The record of a case of kala azar in a woman, forty-two years of age, in which the disease appears to have been contracted in the South of France, probably in Nice A cure was effected with neostibosan *C M W*

CARTIA (Giovanni) Due casi di leishmaniosi interna nell adulto —*Riv Sanitaria Siciliana* 1932 Oct 1 Vol 20 No 19 pp 1371–1376 English summary (4 lines)

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

MELENEY (Henry E.) & FRYE (William W.). **Studies of *Endamoeba histolytica* and Other Intestinal Protozoa in Tennessee : V. A Comparison of Five Strains of *E. histolytica* with Reference to their Pathogenicity for Kittens.**—*Amer. Jl. Hyg.* 1933. May. Vol. 17. No. 3. pp. 637–655. With 1 graph & 1 plate. [13 refs.]

This study was undertaken because of the differences in the clinical manifestations of *E. histolytica* infection in two communities in Tennessee, in one of which a high incidence of infection was associated with little evidence of active amoebic dysentery, and in the other a lower incidence but an acute amoebic dysentery epidemic.

" 1. A study has been made of the relative pathogenicity for kittens of two strains of *Endamoeba histolytica* from the hill country of the Eastern Highland Rim of Tennessee and of three strains from the lowland of West Tennessee. Three hundred and sixty-four kittens were inoculated by rectum or by ileum with cultures of these strains.

" 2. In the first series of rectal injections, performed when the strains had been in culture between 17 and 132 days, the lowland strains from acute cases produced a much higher incidence of infection than did the two hill strains. The lowland carrier strain produced an incidence of infection about equal to the chronic hill strain.

" 3. The second series of rectal injections, performed with four of the strains when they had been in culture between 253 and 262 days, gave about the same incidence of infection with all strains. There was some increase with the hill carrier strain and a decrease with the two lowland strains from acute cases.

" 4. Injection of cultures directly into the ileum gave a higher incidence of infection with all strains than injection by rectum.

" 5. With each of the two hill strains a few kittens known to have been successfully infected showed no macroscopic lesions at autopsy, whereas none of the kittens successfully infected with the three lowland strains were without macroscopic lesions at autopsy.

" 6. Most of the kittens successfully infected with the hill strains showed only a few small lesions in the colon, whereas most of those infected with the lowland strains showed moderate or intense pathology.

" 7. When the duration of the infection in each kitten is considered, the above differences in pathology still hold true. The lesions produced by each of the lowland strains apparently progressed with greater rapidity than those produced by the hill strains.

" 8. These observations seem to indicate that strains of *E. histolytica* from different localities may show differences in the incidence of infection and in the amount of pathology produced in experimental animals.

" 9. A somewhat higher incidence of infection in kittens was obtained with culture transplants two or three days old than with older transplants." *H. M. Hanschell.*

JOHNSTONE (H. G.), DAVID (N. A.) & REED (A. C.). **A Protozoal Survey of One Thousand Prisoners with Clinical Data on Ninety-Two Cases of Amebiasis.**—*Jl. Amer. Med. Assoc.* 1933. Mar. 11. Vol. 100. No. 10. pp. 728–731.

In a protozoal survey of 1,000 inmates of San Quentin prison (California) infestation with *E. histolytica* was found in 9·2 per cent.; 78

of the 92 men with *E. histolytica* infestation lived in or had visited areas of well known amoebic endemicity and 36 of these had lived in tropical regions ; 52 had experienced notable gastro-intestinal upsets.

H. M. H.

ARNETT (John H.), WENRICH (D. H.) & STABLER (R. M.). **A Survey of 401 College Freshmen for Intestinal Protozoa.**—*Amer. Jl. Trop. Med.* 1933. May. Vol. 13. No. 3. pp. 311–315. [10 refs.]

Of 401 freshmen in a Philadelphia college, 95 per cent. came from Pennsylvania and New Jersey and few had travelled extensively. A single normal stool was examined for each person, both by stained slides and fresh smears in saline and iodine. Stained slides revealed 167 protozoan infestations as against 147 for fresh smears. The combined methods yielded 176. One or more species of protozoa were found in 33·1 per cent. of the students, 4·5 per cent. being carriers of *E. histolytica* ; only one carrier of *E. histolytica* suffered from symptoms which might be attributed to the amoeba. *H. M. H.*

DOUGHERTY (Mark S.), Jr. **Amebiasis a Public Health Problem in the Cities of the Southern United States.**—*Amer. Jl. Trop. Med.* 1933. May. Vol. 13. No. 3. pp. 317–325. [20 refs.]

The epidemiology of amoebiasis is reviewed. A report is given of 396 cases of amoebiasis occurring in the hospitals of 13 southern cities in 1927–1931 inclusive and of 55 cases out of 1,103 patients examined during the past five years. The public health problem consists in proper disposal of human excreta ; adequate protection of water supplies ; encouragement of physicians to report cases of amoebiasis ; and careful investigation of the food handler problem. In the main, however, solving of the " amoebiasis problem " rests with the physicians in private practice. *H. M. H.*

DESCHIENS (R.). Comment concevoir les complications viscérales de l'amibiase. [**The Pathogeny of Amoebic Metastasis.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 178–183.

In this critical review the author once more insists that the sole criterion of the amoebic nature of a visceral manifestation is *parasitological proof* of amoebiasis by demonstration of the dysentery amoeba by means of permanent stained preparations. He points out that this proof is still lacking for " amoebic adenitis, bronchitis, cystitis, nephritis, urethritis, cholecystitis." He maintains that there is as yet no reason to entertain any conception of amoebiasis other than the classic one, that is, an intestinal infection (dysentery or colitis) which by metastasis or direct propagation can set up other visceral complications, generally suppurative. *H. M. H.*

DES ESSARTS (J. Quérangal). Amibiase et parasitisme intestinaux à Brest. [**Amoebiasis at Brest.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 192–200.

This investigation reveals that intestinal amoebiasis in its chronic form and of exotic origin is relatively frequent in the port of Brest. Autochthonous cases are rare, although a number of conditions appear to favour propagation of the infection. Healthy carriers of dysentery amoeba cysts are also rare, even among those living in close contact with the amoebiasis cases. *H. M. H.*

TITVINIDZE (I. G.). Zur Diagnostik der Amöbendysenterie. [**Diagnosis of Amoebic Dysentery.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Apr. Vol. 37. No. 4. pp. 175–176.

The author recommends a preliminary washing out of the bowel by rectal clysma of physiological salt solution at 37–38° C. followed by another of 200–500 cc. at same temperature. When passed out it will be found to contain floating flecks of blood stained mucus—washings from the bowel ulcers. These flecks on microscopical examination reveal numerous amoebae. *H. M. H.*

ROCCA (Giuseppe Cascio). Un caso di prostatite da *Entamoeba histolytica.* [**Amoebic Prostatitis.**]—*Riv. Sanitaria Siciliana.* 1932. Oct. 1. Vol. 20 No. 19. pp. 1357-1360, 1363–1366, 1369–1371. With 6 figs. English summary (8 lines).

This case of unusual localization of *E. histolytica* was followed up with more care than the majority of instances recorded. A man of 28 years complained of perineal pain, discomfort and a feeling of weight in the anoperineal region. Examination showed an enlarged prostate, and in the fluid expressed vegetative amoebae were seen, with engulfed red cells. The urine showed none, but in the faeces were both vegetative and cystic forms of *E. histolytica.* Rectal injections of both faeces and prostatic fluid were made into kittens. In a week or so the animals suffered from diarrhoea and lost weight, and in the faeces vegetative amoebae were found. Post mortem the changes in the intestinal wall were those of amoebiasis, macroscopically and histologically. The article is illustrated by microphotographs demonstrating the pathological conditions found in the kittens. *H. H. S.*

SIMIĆ (Tshedomir). L'infection du chien par l'*Entamoeba dispar* Brumpt. [**Infection of the Dog with** *Ent. dispar*]—*Ann. Parasit. Humaine et Comparée.* 1933. Mar. 1. Vol. 11. No. 2. pp. 117–128.

Two strains of *Entamoeba dispar* from Skoplje, of which one was accompanied by Trichomonas, were inoculated intrarectally and the vegetative forms of the two strains inoculated *per os,* into a number of puppies.

The animals infected by *E. dispar* alone were rid of that amoeba in 5 to 7 days, while those infected by both *E. dispar* and Trichomonas, were rid of the amoeba in 5 to 7 days and of the Trichomonas in about one month, if they were over one month old. If they were less than a month old, although the amoeba disappeared they succumbed eventually to the Trichomonas infection. The puppies cured of *E. dispar* infection could not be reinfected with that amoeba. Those infected with *E. dispar* were not made ill by the infection. In the animals' gut the amoeba never became haematophagous, and autopsy revealed no changes in the mucous membrane of the large intestine. The author concludes that the puppy up to two months old is the experimental animal of choice for definitely distinguishing *Entamoeba dispar,* a saprophytic amoeba, from *Entamoeba dysenteriae* —the cause of amoebic dysentery. *H. M. H.*

CRAIG (Charles F.) & KAGY (Edwin). **A Study of Complement Fixation in Experimental Amebiasis in Dogs.**—*Amer. Jl. Hyg.* 1933. July. Vol. 18. No. 1. pp. 202–219. [10 refs.]

The authors' experimental studies, here reported in detail, lead them to conclude that complement-fixing (C.F.) bodies are present in blood serum of dogs experimentally infected with *E. histolytica* and can be demonstrated when alcoholic extracts of cultures of this parasite are used as antigens. C.F. bodies are not present in blood serum of dogs free from *E. histolytica* infection. C.F. bodies from *E. histolytica* may be demonstrated in blood serum of experimentally infected dogs as early as three days after colonic inoculation, and the majority of infected dogs will give a positive C.F. within fifteen days after colonic inoculation. Positive C.F. reactions three to five days after colonic inoculation of *E. histolytica* indicate severe and widespread amoebic ulceration of intestine as proven by lesions observed at autopsy. C.F. bodies for *E. histolytica* disappear from blood serum of experimentally infected dogs after recovery from the infection. In dogs experimentally infected with *E. histolytica* the complement-fixation reaction, if positive, is specific for such infection when alcoholic extracts of cultures of this amoeba are used as antigens. *H. M. H.*

[For Craig's last paper on this subject, see page 387, above.]

CRAIG (Charles F.). **Further Observations upon the Complement Fixation Test in the Diagnosis of Amebiasis. An Analysis of the Results of the Test in One Thousand Individuals.**—*Jl. Lab. & Clin. Med.* 1933. June. Vol. 18. No. 9. pp. 873–881. [18 refs.]

The author's own conclusions are that—

Specific complement fixing (C.F.) bodies may be demonstrated in blood serum of individuals infected with *E. histolytica* when alcoholic extracts of cultures of this parasite are used as antigens. Normal individuals or those suffering from other infections or diseases do not give a positive C.F. reaction with such antigens unless there is a coincident infection with *E. histolytica*. The specific (C.F.) bodies disappear from the blood serum following antiamoebic treatment and disappearance of *E. histolytica* from the faeces. In relapsing cases of amoebiasis the C.F. test, which has been negative during the interval of apparent freedom from *E. histolytica*, again becomes positive, in rare instances even before the parasite is again demonstrable in the faeces. Thus a negative reaction, unless repeatedly so for several weeks, does not prove absence of amoebic infection or that antiamoebic treatment has resulted in cure. The time of disappearance of the positive C.F. reaction after treatment resulting in disappearance of *E. histolytica* from faeces varied between three and twenty-eight days. In 86·6 per cent. of cases studied the reaction vanished within fourteen days after cessation of antiamoebic treatment, and in 96·6 per cent. within twenty-one days after cessation of treatment resulting in disappearance of parasites from faeces. Individuals infested with other species of amoebae, or with intestinal flagellates, do not give a positive C.F. with this test unless *E. histolytica* is also present. The C.F. reaction occurs in all stages of amoebiasis but strongest positive results are usually obtained in symptomless "carriers" or in those presenting mild symptoms of infection with *E. histolytica*. In several cases of very acute amoebic colitis the reaction has been doubtful or negative, although in most severe cases it has been positive. The test has proved of value in diagnosis of cases of amoebic abscess of liver without intestinal symptoms; of cases of apparently healthy *E. histolytica* "carriers," and of cases presenting atypical or mild symptoms of infection; and in the control of antiamoebic treatment. [See also Vol. 28, p. 262.]

H. M. H.

BACILLARY DYSENTERY.

MANZUOLI (J.). Epidemia de disentería bacteriana a bacilos Shiga en Las Varillas (Provincia de Córdoba). [**An Outbreak of Bacillary Dysentery in Las Varillas (Córdova).**]—*Semana Méd.* 1933. Jan. 5. Vol. 40. No. 1 (2034). pp. 70–71.

MONTOYA (D. J.) & ORTIZ (L. J.). Una epidemia de disentería bacilar en Las Varillas (Córdoba).—*Ibid.* pp. 71–73.

SORDELLI (A.) & SAVINO (E.). Epidemia de disentería bacilar en Las Varillas (Provincia de Córdoba).—*Ibid.* pp. 73–76.

A description of an outbreak of dysentery from the clinical and bacteriological aspects. The first and second articles deal with the clinical side of the question. There were 30 cases in all, and, though 5 patients died, the general trend of the disease was mild. Many of the patients were young, 2–14 years. Believing that the condition was amoebic, yatren and emetine were given, and it was only when this proved ineffectual that the bacillary nature of the infection was suspected and specimens were sent to the laboratory, and *Bact. dysenteriae* Shiga, was isolated. Serum for treatment was sent by Dr. Sordelli, Director of the Bacteriological Institute. In most cases there was little or no rise of temperature, colic was not severe, and though the stools numbered up to 20 (in one severe case from 35–100) in the 24 hours, the patients were in many instances able to keep at work. In the adults the symptoms were "quite benign." Only the very early cases were severe; 4 children died in a week. The attacks ran a course of 1–15 days after an incubation of 1–5 days. Infection is believed to have been fly-borne. The third article appeared (verbatim) in *Folia Biol.* and was abstracted in *Bulletin of Hygiene*, 1933, Vol. 8, p. 258.

H. H. S.

WOLFF (J. W.). Bijdrage tot de epidemiologie der bacillaire dysenterie [**Epidemiology of Bacillary Dysentery.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Vol. 73. No. 9. pp. 514–523. With 3 graphs.

In this article a direct parallel is made out, for the labour population of the plantations of Sumatra, with the experimental results obtained in mouse populations as a result of immigration and emigration. This parallelism, however, applies only to Y-Flexner dysentery and not to Shiga dysentery. Infection in the latter case was ascribed almost solely to the indigenous Batak population of the highlands. Introduction of fresh cases and accessions to the labour force took place continuously from Java to Sumatra until the process was exactly reversed in 1931 with closure of many of the estates. This influx and efflux is reflected, for the period 1925–1932, in the number of cases and the morbidity rates of Y-Flexner dysentery. *W. F. Harvey.*

CASTELLANI (Aldo). **A Little-Known Type of Chronic Colitis (Chronic Metadysentery).**—*Jl. Trop. Med. & Hyg.* 1933. Apr. 15. Vol. 36. No. 8. pp. 109–115. [36 refs.]

The views of the author and his contribution to the differentiation of that group of dysentery bacilli which he has named meta-dysentery bacilli, are well known. In this lecture he refers to the common occurrence of a chronic disease, " not rarely starting in childhood or youth and lasting for many years," which owes its causation to a bacillus of this group. Illustrative cases are described. The agglutination of the blood of 59 out of 91 cases was positive at a dilution of 1 in 80 or over with one or more varieties of the metadysentery bacilli. " A positive diagnosis can be made only by bacteriological methods."

W. F. Harvey.

HOSOYA (Seigo), TERAO (Shuzo) & TAKATA (Shin). **A Method for Purification of Shiga Dysentery Bacillus Toxin and Antigenicity of the Anatoxin derived from Purified Toxin.**—*Japanese Jl. Experim. Med.* 1933. June 20. Vol. 11. No. 3. pp. 153–169. [30 refs.]

The method used for purification was the exotoxin purification method of HOSOYA and MIYATA combined with WILLSTÄTTER'S enzyme purification method and the yield was satisfactory. An antiserum, obtained by using the formalinized toxin (anatoxin), had a comparatively high value but did not precipitate the anatoxin and did not agglutinate Shiga dysentery bacilli. *W. F. Harvey.*

ARCHER (G. T. L.). **Note on a Non-Mannite-fermenting Organism recovered from Two Cases of Dysentery.**—*Jl. Roy. Army Med. Corps.* 1933. July. Vol. 61. No. 1. pp. 55–56.

This organism isolated in Wellington, India, differed from *Bact. dysenteriae* Shiga by fermenting dulcite and from *Bact. dysenteriae* Schmitz by fermenting dulcite and failing to produce indole. The serum of the patients agglutinated *Bact. dysenteriae* Schmitz but no other organisms of the dysentery group. Agglutination tests applied to the organism itself were negative with anti-Shiga and anti-Schmitz sera. *W. F. Harvey.*

KESSEL (John F.) & ROSE (Edythe J.). **Bacteriophage Therapy in Bacillary Dysentery of the Flexner Type.**—*Ann. Intern. Med.* 1933. Mar. Vol. 6. No. 9. pp. 1193–1199.

The controls applied in this series of cases appear to be adequate to meet objections both in regard to being alternate as far as practicable and as regards the use of a phage with sufficiently high lytic potency towards the bacterium isolated from the patients. Twelve cases were treated with bacteriophage in 1930 and their stay in hospital averaged 11·9 days as compared with 10·1 days for the ten controls. Twenty-three cases treated in 1931 had an average stay in hospital of 11 days and 4 deaths as compared with 12·1 days and 3 deaths in the 23 control cases. " These results indicate that the oral administration of bacteriophage as used in this study, produces no marked clinical benefit over the recognized symptomatic care and treatment." *W. F. Harvey.*

Bouffard (G.) & Vaucel (M.). Essai de prophylaxie en Afrique Equatoriale Française des dysenteries bacillaires par la toxine formolée. **[Prophylaxis of Bacillary Dysentery in Tropical Africa by Formolized Toxin.]**—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 154–168.

The authors' experiences lead them to conclude that vaccination with formolized toxin to be efficacious requires as careful a technique as with diphtheria anatoxin. There should be a three weeks' interval between injections. Immunity conferred is strictly specific. They are not able to estimate precisely its value, but note that its employment has been followed by a decrease in mortality among those labour groups frequently infected with Shiga bacillus. Duration of immunity cannot yet be fixed but appears to be long enough to keep the infection sporadic and to avoid epidemic explosions. To prepare an active anatoxin it is indispensable to make use of a very toxic Shiga strain.

H. M. H.

Gupta (B. M. Das). **Fatal Flexner Bacillus Infection in an Anthropoid Ape** (*Hylobates hoolock*).—*Indian Med. Gaz.* 1933. Mar. Vol. 68. No. 3. pp. 138–139.

The history of this monkey is of interest from the following points—its susceptibility to monkey malaria; its refractoriness to human quartan malaria; the presence in its colon of an entamoeba conforming in all respects to *Entamoeba histolytica* of man, but apparently not a tissue-invader; and the fatal infection with an organism corresponding in all particulars to the bacillus of Flexner. *H. M. H.*

Acanfora (Giuseppe) Le lesioni anatomo-patologiche sperimentali da bacillus ceylonensis " A " (B. dysenteriae Castellani-Sonne).—*Riforma Med.* 1933. July 20. Vol. 49. No. 23. pp. 863–864, 867–868.

Berret & Nguyen-ba-Tung (M.). Abcès du foie et collections sous-phréniques. *Bull. Soc. Méd.-Chirurg. Indochine.* 1932 Nov.–Dec. Vol. 10. No. 8. pp. 806–810.

Botreau-Roussel (M.) & Huard (P.). Deux observations d'amibiase cutanée chirurgicale.—*Bull. Soc. Path. Exot.* 1933 Feb. 8 & 9. Vol. 26. No. 2. pp. 202–206.

Botreau-Roussel & Huard (P.). Appendicite aiguë grave chez un amibien suivie d'abcès du foie à streptocoques développé sur une ancienne cicatrice d'abcès amibien.—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 405–411.

Botreau-Roussel & Huard (P.). Deux observations d'amibiase cutanée chirurgicale. (2e partie)—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 411–415. [19 refs.]

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PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE. 1933. June. Vol. 26. No. 8. pp. 1049–1062 (Sect Trop. Dis. & Parasit pp. 59–72). With 1 coloured plate & 1 chart.—Discussion on the Diagnosis of Chronic Diarrhoeas [HUTCHISON (Robert), MANSON-BAHR (P. H.), NORBURY (Lionel E. C.), MILLIGAN (E. T. C.), FAIRLEY (Hamilton)].

SANGIORGI (Giuseppe). Contributo alla conoscenza delle dissenterie miste.—(La "Coliamebo blastocistosi")—*Pathologica* 1933. Feb. 15 Vol 25. No. 496. pp. 71–74. With 2 figs. [26 refs.] English summary.

SCAFFIDI (Vittorio), Jr. Degenerazione amiloide del fegato secondaria ad ascesso amebico—*Policlinico.* Sez. Prat 1933. May 8. Vol. 40. No. 19. pp 736–740. With 1 fig.

RESIO (Luis Leon). Angiocolitis supurada amebiana.—*Prensa Méd. Argentina.* 1933. May 17. Vol. 20. No. 20 pp 1104–1106

ROSEBERY (Sidney). Dysentery: a Practical Survey of One Thousand Cases in a General Hospital in Egypt, 1918–1919.—*Med Jl Australia* 1933. Apr. 1. 20th Year Vol 1 No 13 pp. 391–402. With 4 charts [44 refs]

SLEEPING SICKNESS.

FAIRBAIRN (H.). **Experimental Infection of Man with a Strain of** *Trypanosoma rhodesiense* **Apparently Susceptible to Normal Human Serum** *in Vitro.*—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 251–264. With 1 chart & 1 plate. [10 refs.]

A strain of *T. rhodesiense* was found to be still infective to man after it had been maintained by passage through rats for a period of nearly a year, during which time it had become sensitive to human serum *in vitro.* From this observation it is argued that the trypanolytic power of human serum is no indication of the power of the body to deal with trypanosomes.

The strain in question was isolated from a Kibondo native on 21st February, 1932, and maintained until 31st January, 1933, by passage through a series of 19 rats. The reaction to undiluted normal human serum of the strain from each rat was tested, and the results are shown in a table. The technique adopted was identical with that described by the reviewer and his colleagues (1930), except that the temperature was maintained at 37°C. for 12 hours during the daytime, but, owing to the fact that the incubator had no regulating mechanism, it was allowed to fall to 21°C. during the night. Furthermore, rats were usually subinoculated with the trypanosome-serum mixture at the end of 24 hours to see if the absence of trypanosomes, as shown by microscopical examination, really meant that all the trypanosomes had been killed by the serum.

According to this technique the strain appeared to have lost its serum resistance from the 9th rat passage onwards (*i.e.*, 176 days after isolation). At the 19th rat passage, when it had been isolated 345 days, its serum resistance was tested against 4 tubes of the author's serum. Immediately after the tubes had been put up, 1 cc. of the Ringer-glucose-trypanosome mixture was inoculated subcutaneously into a rat, and 1 cc. into the author's arm. The rat became infected on the 4th day and the author showed trypanosomes in his blood on the 8th day. In none of the 4 tubes containing the serum-trypanosome mixture were trypanosomes discovered by microscopic examination after the second hour, but one of the four rats inoculated with the mixture after 24 hours became infected.

Details are given of the course of the infection in the experimentally infected human being. The first sign of the disease was a lump about the size of an almond at the site of injection on the sixth day ; the following day the lump was larger and its borders more diffuse ; it was very tender, the centre was a salmon-coloured patch about the size of a sixpence, and it was surrounded by a lilac areola. The same day the temperature rose to 100·2°F. Trypanosomes were first found in the blood on the 8th day ; a course of Bayer 205 was then given and the patient recovered.

Fairbairn then passes to a discussion of the significance of these observations. He begins with the following quotation from a paper of the reviewer and his colleagues : " It seems to us incredible that our laboratory strain of *T. rhodesiense* which, as we have shown, is killed by normal human serum, or plasma, *in vitro* at 37°C. within a few hours . . . could infect man " ; and later : " The pronounced sensitiveness to normal human serum of *T. rhodesiense* which has sojourned for some time . . . in vertebrate hosts other than man, provides almost overwhelming evidence that normal human beings cannot become infected with such strains" [see this *Bulletin*, Vol. 27, p. 804]. Fairbairn writes that in the light of the present experiment both these assumptions appear unfounded.

[In view of the importance of the subject the reviewer may perhaps be pardoned if he makes a few observations on this very interesting paper. In the first place it should be pointed out that by means of omissions Fairbairn has misquoted the reviewer and his colleagues to a very material degree. In the first quotation the words "even though the serum or plasma is diluted to such an extent that its concentration in the medium is only 1 : 25,000" are omitted, and in the second "how long we do not yet know, but probably it will be found to be comparatively short."

There is of course very great difference between the sensitiveness of a strain which is killed *in vitro* by human serum diluted to the extent of 1 : 25,000 and that which is merely destroyed by undiluted serum; and in the paper referred to the reviewer and his colleagues were careful on this ground to distinguish between their old laboratory strain of *T. rhodesiense*, which has been in laboratory animals for many years, and their recent "Sherifuri" strain which had been isolated from man for less than one year. We stated that it seemed to us incredible that our *T. rhodesiense* strain which was killed *in vitro* by human serum diluted 25,000 times could infect man, and we were careful to refrain from expressing any opinion regarding the infectibility of the much more recently isolated "Sherifuri" strain, which was much less sensitive to human serum *in vitro*.

It is true that we did not subinoculate rats with the serum-trypanosome mixture at the end of 24 hours—as did Fairbairn, but owing to the extent to which human serum could be diluted and still cause the apparent destruction of all the trypanosomes in the medium within a few hours as judged by microscopic examination, such a procedure did not appear necessary. Assuming, however, that Fairbairn's technique was beyond criticism and that owing to thorough mixing all the trypanosomes were in contact with the undiluted human serum for 24 hours, then the fact that such mixtures were sometimes still capable of infecting rats shows conclusively that the strain was not very sensitive to human serum. The reviewer and his colleagues have pointed out several times that all the individuals in a trypanosome suspension are not killed by the same concentration of serum or drug in exactly the same time; isolated individuals can sometimes be seen moving actively and apparently in a normal state some time after the vast majority have completely disintegrated.

In short it seems to the reviewer that Fairbairn's results can be explained on the assumption that his strain was barely sensitive to human serum. Undiluted serum destroyed the majority of the individuals, but a few survived, as is shown firstly by the fact that one of the rats inoculated with the 24-hour old serum-trypanosome mixture from the rat of the 19th passage (*i.e.*, the passage from which the human being was injected) became infected; and secondly by the fact that one of two rats inoculated from the 24-hour old serum-trypanosome mixture of the 21st passage also became infected. As a matter of interest it should be noted that the data set out in Fairbairn's table do not give the slightest evidence that the trypanosomes of the 19th or 21st rat passages were any more sensitive to human serum than were those of the 1st or 2nd passages. For such reasons as these the reviewer remains unconvinced that " the trypanolytic power of serum, or the lack of it, is no indication of the power of the body to deal with trypanosomes."] *W. Yorke.*

FAIRBAIRN (H.). **The Action of Human Serum** *in Vitro* **on Sixty-Four Recently Isolated Strains of** *T. rhodesiense.—Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 185–205.

The author has examined the action of human serum *in vitro* on sixty-four strains of *T. rhodesiense* obtained during an outbreak of sleeping sickness in the Kibondo District of Tanganyika Territory.

He employed the technique devised by the reviewer and his colleagues (1929). The temperature was maintained at 37°C. for the 12 hours during the daytime, but, as the incubator had no regulating mechanism, the lamp had to be removed for the night and the temperature gradually fell to about 21°C. Rats were usually sub-inoculated with the trypanosome-serum mixture at the end of 24 hours to ascertain whether the absence of trypanosomes, as shown by microscopic examination, really meant that all the trypanosomes had been killed by the serum. The results of the examination of 64 strains of *T. rhodesiense,* all tested in the first rat passage from man, are shown in a table, the results of which indicate that the majority of the strains tested were resistant to human serum.

The author then passed to a consideration of the question whether the passage of the strains through series of rats had any effect on the resistance to human serum. Seventeen of the 64 strains were consequently repeatedly subinoculated into rats, and their resistance to human serum examined at each rat passage. The results obtained are summarized in a table, which shows that frequently the resistance of the trypanosomes to human serum disappears as early as the second rat passage and may reappear in subsequent passages.

A few experiments with *T. brucei,* made with the first rat passage after isolation, showed that the trypanosome is susceptible to human serum. It is hoped to continue this line of work. The author believes that if it can be shown conclusively that *T. rhodesiense* maintains its resistance to human serum after each cyclical passage through the tsetse, then a biological method of differentiating *T. brucei* and *T. rhodesiense* would result ; those polymorphic trypanosomes, recovered from game or fly, which showed, when tested *in vitro,* at the first rat passage, a resistance to human serum, would be justifiably called *T. rhodesiense.*

The last section of the work relates to the examination of the trypanocidal action of sera obtained from various Kibondo natives who came to the out-patient department for the treatment of yaws, ulcers, etc. In all, 21 sera were examined without any marked variation in trypanocidal action being observed. On two occasions serum was taken from a new sleeping sickness case before treatment, and its trypanocidal power tested against a heterologous strain. On both occasions, they showed similar trypanocidal power to that of Fairbairn's own serum.

The following summary is given :—

" 1. During a recent outbreak of sleeping sickness in the Kibondo District of Tanganyika Territory, the action of human serum was tested *in vitro* at 37°C. against 64 strains of *T. rhodesiense* (all in the first rat passage). The majority of these strains were shown to be resistant.

" 2. It was shown that the resistance to human serum was a very variable quality, fluctuating from rat passage to rat passage.

" 3. In a large number of the 2nd rat passages tested, this resistance to human serum has disappeared, to reappear later; and it is therefore suggested that in future, when testing any strain, it should always be done in the 1st rat passage, or else over a long and consecutive series of subsequent passages.

" 4. Following Yorke, Adams and Murgatroyd's technique, it has been shown that it is not justifiable to say a strain is non-effective [*sic*] just because no trypanosomes are visible in the fluid after 2 to 4 hours, but that this must be established by sub-inoculating rats.

" 5. On the other hand, even though an occasional trypanosome is seen in the fluid at the end of 24 hours, the sub-inoculated rat may not be infected.

" 6. Twenty-nine human sera (both European and native) were tested for their trypanocidal power, and they were all of the same value."

W. Y.

ADAMS (A. R. D.). **A Record of an Investigation into the Action of Sera on the Trypanosomes Pathogenic to Man.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 309–326.

This paper gives details of a considerable number of experiments devised with the object of ascertaining the action of human sera *in vitro* on various strains of trypanosomes—*T. gambiense*, *T. rhodesiense* and *T. brucei*. The technique adopted was that described by YORKE, ADAMS and MURGATROYD, 1929, except that the strains were usually maintained in guineapigs instead of in mice.

Four strains of *T. gambiense* from Uganda preserved their complete resistance to human serum over a period of 12 months maintenance in laboratory animals. The results confirm the observations of YORKE, ADAMS and MURGATROYD that human serum fastness is a characteristic of *T. gambiense* and is preserved for a considerable period of time through repeated passages in laboratory animals. In addition one of the strains was tested against the serum from an untreated case of *T. gambiense* infection, from a baboon which had been proved experimentally to be immune to *T. gambiense* infection, from a sheep infected many months with several strains of *T. gambiense*, and finally from a fowl. The serum of the normal human being had no effect on the trypanosomes; that from the sleeping sickness patient destroyed all the trypanosomes when diluted 1 : 2; that from the baboon destroyed all the parasites when undiluted and almost all when diluted 1 : 10; that from the infected sheep destroyed all the parasites when diluted 1 : 10 and almost all when diluted 1 : 50; and that from the fowl had no effect on the trypanosomes. Adams considers that these observations—particularly the failure to demonstrate a powerful trypanocidal substance in the serum of the baboon—are of great interest " in view of their obvious inconsistency with any thesis that trypanocidal body in the serum is alone responsible for immunity against trypanosomal infection."

Four strains of *T. rhodesiense* recently isolated from man were obtained from Dr. CORSON of Tanganyika. Each of these strains in the first passage animal showed definite resistance to the action of pure human serum. The results are shown in a table from which it is seen that in the presence of human serum the number of trypanosomes exhibits a marked early decrease and after this immediate drop the decrease during the subsequent 18 hours was very slight. Adams writes " It would appear that a certain proportion of the parasites is susceptible to the action of human serum and is killed in a short time, whilst the resistant parasites survive the full period of 24 hours at 37°C." [This observation is in harmony with those of FAIRBAIRN who found that although microscopic examination of the serum-trypanosome mixture was negative, nevertheless sometimes inoculation into rats produced infection.]

The four strains were maintained by passage through guineapigs and the sensitiveness to human serum examined from time to time; all four became definitely serum sensitive; Strain A at the 6th passage, Strain B at the 5th, Strain C at the 8th and Strain D at the 3rd passage, in periods varying from 2 to 5 months after isolation from man.

In August 1931, six further strains of *T. rhodesiense* were obtained from Dr. CORSON; all were some months old and had been passed through a number of animals. The results of testing these strains are set out in a table and show that they were all rapidly killed on exposure to strong concentrations of serum. It is noted that these strains had lost their serum resistance more quickly than the previous four strains, and it is suggested that this is possibly due to the fact that the second batch were passaged through rats instead of through guineapigs.

The old Liverpool strain of *T. rhodesiense*, sent to ADAMS by the reviewer, was tested at the same time and was found to be killed by the same great dilutions of human serum as had been shown in earlier work. This strain was found to be rapidly fatal to a sheep and attempts made to infect *G. palpalis* (624 flies were used) failed.

Experiments were next undertaken to ascertain whether " fly " transmission of a strain of *T. rhodesiense* had any effect on its reaction to human serum. Three strains were transmitted by fly from guineapig to guineapig on one or two occasions, and their reactions to human serum noted before and after the passages. The results of these experiments are also summarized in a table from which it is seen that after a single fly transmission loss of resistance to human serum had taken place and that this was not the case when the strain was passaged by the syringe.

The reactions of two strains of *T. brucei* to human serum *in vitro* were studied: the first of these, called the N'songezi strain, was obtained by the author in the Ankole District where human trypanosomiasis is unknown; and the second, Hornby's virulent strain, came from Tanganyika. Both were definitely sensitive to human serum, but not more so than were the *rhodesiense* strains after a few months' passage in laboratory animals. *W. Y.*

DUKE (H. Lyndhurst). **A Study of the Behaviour of *T. rhodesiense* Recently Isolated from Man, in Antelope and Other African Game Animals. Part I.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 215–236.

The main object of the research, of which this paper records the preliminary stages, is to ascertain whether, after a year or two in antelope, *T. rhodesiense* stills retains its power of infecting man.

The paper opens with a summary of the discussion which has gone on during the last 20 years regarding the relationship of *T. gambiense*, *T. brucei*, and *T. rhodesiense*. It is now known that *T. rhodesiense* can be introduced into game animals, and clearly this must also happen in nature. The present paper gives details of a number of experiments devised with the object of ascertaining whether certain game animals could be infected with *T. rhodesiense*, and if so what was the nature of the infection which resulted.

Three strains of *T. rhodesiense* recently isolated from natives of Tanganyika were obtained from Dr. FAIRBAIRN. These three strains (viz. Tinde 1, 2, and 3) were found to be indistinguishable from one another, except in one respect; whilst Tinde 2 and 3 are characterized by producing very heavy gland infections in Glossina, in the mature gland infection with Tinde 1 the trypanosomes are always much less numerous, and are sometimes so scanty that very careful search is necessary to find them. As this proved to be a constant phenomenon, it seems that this sparse type of gland infection is actually a character of Tinde 1.

A reedbuck, a ntalaganya (*Cephalophus caeruleus melanorrheus*), 3 bushbuck, 1 oribi, 3 wild pigs, 1 pig of an undetermined species, and a serval cat were all infected with one or other of these three strains. In every instance the infection was caused by the bite of cyclically infected tsetse (*G. palpalis* or *G. morsitans*). These experiments are recorded in very considerable detail. It is noted that whilst the reedbuck, bushbuck and oribi showed no signs of trypanosomal infection, the ntalaganya died of uncomplicated trypanosomiasis in 110 days.

Attempts were made to infect Glossina from the antelope after they had been infected for considerable periods, and fly were infected from the reedbuck on the 107th day, from the bushbuck on the 108th day, and from the ntalaganya on the 87th day. The wild pig (*Potamochoerus choeropotamus*) proved to be very susceptible to infection with *T. rhodesiense*, and another undetermined species of wild pig behaved in a similar manner. The serval cat was likewise very susceptible and died on the 45th day of the disease. Tsetse were readily infected from this animal. *W. Y.*

DUKE (H. Lyndhurst). **Relative Susceptibility of the Sexes of Glossina to Infection with Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 355–356.

In this note Duke qualifies the statement made in a previous paper [this *Bulletin*, Vol. 27, p. 847], viz., that there was no significant difference between the two sexes of *G. palpalis* in their susceptibility to *T. gambiense* and *T. rhodesiense*.

Mr. MCDONALD, the Laboratory Assistant to the Human Trypanosomiasis Institute, has recently re-examined the registers wherein are recorded the transmission experiments with tsetse and various polymorphic trypanosomes performed during the last six or seven years, and has reached the conclusion that under laboratory conditions the female of *G. palpalis* is more susceptible to infection with *T. gambiense* or *T. rhodesiense* than is the male. Duke considers that the facts that the female flies feed more readily than the males, and that they tend to survive better in captivity, may have a bearing on this conclusion. *W. Y.*

DUKE (H. Lyndhurst). **The Trypanosomes of Man: their Resistance to Arsenical Drugs.**—*Lancet.* 1933. Sept. 2. pp. 553–557.

This paper appears to have been instigated by recent articles of the reviewer and his colleagues in which they claim to have produced "unequivocal evidence that the acquired character of 'arsenic resistance' in trypanosomes is transmitted unimpaired through the biological cycle of the parasite in Glossina, its natural invertebrate host."

[*ante*, p. 448]. The main argument, which Duke elaborates with considerable ingenuity in his present very interesting communication, is that it is not safe to reason by analogy, and that it by no means follows because an acquired arsenic-resistance in *T. rhodesiense* is transmitted unimpaired through Glossina the same thing will happen in the case of *T. gambiense.*

The first portion of Duke's paper is devoted to replying to certain criticisms made by the reviewer in respect of an earlier paper by Duke recording experiments performed with the object of ascertaining whether acquired arsenic resistance in *T, gambiense* was transmitted through *Glossina palpalis.* [Nothing seems to be gained by discussing this matter further here ; anyone interested can consult the original articles and form his own opinion. Even this, however, seems hardly worth while, as Duke now writes of his earlier work, " that these experiments were not regarded as conclusive is, however, made quite clear in the text of the report." Moreover, it is also quite clear that if Duke now regarded his earlier experiments as conclusive, he could not have written the present paper.]

Duke next passes to a consideration of the fact that different strains in nature exhibit different sensitivity to arsenicals " From the standpoint of the clinician confronted by native populations affected with trypanosomiasis, normal *T. rhodesiense* is resistant and normal *T. gambiense* is sensitive to therapeutic doses of approved arsenical drugs."

Wallace (1930) found that some of his guineapigs infected with *T. gambiense* were sterilized by a single dose of atoxyl as low as 0·01 gm. per kilo. and none relapsed after 0·03 gm. per kilo. ; in guineapigs infected with *T. rhodesiense* doses of 0·03 gm. per kilo were given without causing any disappearance of trypanosomes and relapse occurred after 0·07 gm. per kilo. Recent work has, however, shown that these conclusions require some modification , they were based upon experiments with a limited number of animals and strains, and it is also highly probable that importance attaches to the age of the infection in the guineapig at the time of the administration of the drug. [The number of parasites in the peripheral blood certainly influences the result in determining the minimum effective dose.] At the present stage of Wallace's investigations, it appears that in guineapigs infected with *T. rhodesiense, T. brucei* or *T. gambiense,* an initial dose of 0·03 gm. per kilo. of atoxyl is the critical dose if trypanosomes fail to disappear from the blood within a week after the administration of this dose to a guineapig during the first two or three weeks of infection, suspicion at once arises that the strain is not normal *T. gambiense,* but either *T. rhodesiense, T. brucei* or a *T. gambiense* possessed of abnormal resistance to arsenic. Reference is made to Sherifuri strain from Northern Nigeria, which resembled *T. rhodesiense* in many respects and was found by the reviewer to be completely resistant to aromatic arsenicals ; and also to the fact that three of ten Nigerian strains examined by Lester showed a natural resistance to tryparsamide in small laboratory animals.

The practical incentive to research in drug resistance has nothing to do with *T. rhodesiense.* The expression " drug-fastness " used in connexion with human trypanosomiasis means to the medical man the fastness or resistance occasionally exhibited by *T. gambiense* against drugs that normally destroy it. As the reviewer has already pointed out, the matter is of particular importance in the French Congo in view of the prophylactic measures adopted by the French of wholesale atoxylization. Duke asks himself, what are the possible explanations of the continued presence of trypanosomes in the blood of a *gambiense* case after a full course of arsenic? He writes " First, he may have been reinfected. This cause can be ruled out at once in some cases. Secondly, his system may have been unable to cope with the drug owing to some temporary or constitutional disability. Thirdly, he may be infected with a strain possessing an abnormally high natural resistance to arsenic. And finally, if his trypanosomes have indeed acquired increased resistance by contact with the drug, there is always a probability that the strain was originally possessed of an abnormal natural resistance." Regarding the second possibility Duke refers to the work of the reviewer and his colleagues, who showed that a strain resistant in one species of host is likewise resistant in another, and furthermore that the quality of resistance is inherent in the trypanosomes themselves. Duke considers, however, that it does not necessarily follow that it will manifest that resistance equally when trammelled by the reactions of a host animal capable, even when unaided by a drug, of exerting a restraining effect on the trypanosomes' activities. In support of this he quotes the enormous differences noted by the reviewer in the response of one and the same strain to tryparsamide in different species of animal. [In the reviewer's opinion these differences are largely if not entirely due to variations in the rate of reduction and excretion of the drug.]

With regard to the third possible explanation Duke states that 4 years ago he requested medical officers in Uganda to collect and send him any cases that had resisted treatment with tryparsamide in the West Nile area. Three such were received; the first was an undoubted case of *T. rhodesiense*, but the other two were *T. gambiense*. When examined in the guineapig both the last strains proved slightly more resistant than those previously tested. One of the strains was non-transmissible, but the other was readily transmitted by *G. palpalis* and its reactions to arsenic then were found to be as before transmission. [This seems to ignore the possibility that the arsenic given in the West Nile area to these patients before they were sent to Duke had something to do with the enhanced arsenic resistance found by Duke.]

The only records of attempts to make recently isolated strains of *T. gambiense* resistant to drugs are those of WALLACE at Entebbe and of TAYLOR in West Africa, who both succeeded after some trouble in preparing a drug-fast strain. Neither, however, was able to transmit the fast strain through Glossina. Duke considers that it is not unlikely that the majority of so-called drug-fast strains of *T. gambiense* in man in Africa are merely strains possessed of an exceptional natural resistance to arsenic, and that such strains will no doubt retain their resistance when passed through the tsetse. He is not convinced that the reviewer and his colleagues are justified in regarding the conclusions drawn from their study of *T. rhodesiense*, *T. brucei*, *Glossina morsitans* [and *G. palpalis*] as applicable to the sphere of *T. gambiense* and its normal vectors *G. palpalis* and *G. tachinoides*.

Duke summarizes his points as follows :—

> " The exemplary series of investigations carried out in the last few years by Yorke and his colleagues have revolutionised our conceptions of drug resistance in trypanosomiasis. As the result of these researches we now know how to maintain trypanosomes alive in vitro for a considerable period of time; we know the manner in which arsenical drugs act on the trypanosomes; how best to increase the natural resistance of a strain, and

how that resistance operates, and that the resistance acquired is not resistance to arsenic but to the phenyl radicle present in all trypanocidal arsenical drugs used in treatment of the disease in man, and, finally, that a strain resistant in one species of host is resistant in another But the final word has not yet been spoken on the subject of acquired resistance in normal *T gambiense* against tryparsamide and its allies The outstanding questions seem to me to be —

" (1) Can a strain of *T gambiense* recently isolated from a patient into whose blood the trypanosome was introduced by biologically infected tsetse, acquire permanent resistance to a drug as the result of exposure to occasional small doses ?

" (2) If it can do so, does the acquisition of resistance in any way impair the transmissibility of the strain by tsetse ?

" (3) If the strain retains its transmissibility by tsetse does the acquired resistance to arsenical drugs survive passage through the fly ?

' The question whether acquired drug resistance survives the passage of a strain through tsetse is but one aspect of an important biological problem —namely, the rôle of the insect intermediary in maintaining the character of the protozoon it transmits

If Yorke and his colleagues interpretation of their results is correct, then we must conclude that an acquired character can survive the seemingly drastic changes that a trypanosome undergoes during its cyclical development in the tsetse Schilling, as the result of transmission experiments performed with a highly virulent strain of *T brucei* and *G morsitans*, has lately reached diametrically opposite conclusions maintaining that passage through the tsetse purges a strain of all acquired abnormalities

The subject is thus of great biological as well as practical interest and calls for the most exhaustive inquiry along several different lines of research '

[The recent paper of VAN HOOF and HENRARD summarized in the present number bears directly on this subject and may perhaps resolve some at least of Duke's doubts] *W Y*

VAN HOOF (L) & HENRARD (C) La transmission cyclique de races résistantes de " Trypanosoma gambiense " par " Glossina palpalis " **[Cyclical Transmission of Resistant Strains of** *T gambiense* **by** *G palpalis*]—*Ann Soc Belge de Méd Trop* 1933 June 30 Vol 13 No 2 pp 219–244

The main object of the work described in this paper was to ascertain whether an arsenic-resistant strain of *T gambiense* could be transmitted by Glossina and, if so, whether the strain, after cyclical passage through the tsetse preserved its resistant character

Details are given regarding 8 strains of *T gambiense* used in these experiments but, as successful transmission was only accomplished in respect of two of them, it will suffice to mention only these two

Strain G, Bernard Lisala —This patient aged 30 was probably infected on the river n'Giri near Kinwenza The disease was diagnosed on 19 Sept, 1932, by gland puncture, at this time lumbar puncture showed 80 cells per cmm Between 22 Sept and 23 Nov, 1932, he was given 9 injections each of 2 gm of tryponarsyl, lumbar puncture now showed 20 cells per cmm On 14 Dec, 1932, many trypanosomes were found The patient was then treated with Dn 12 [a pentavalent antimonial compound of quinoline] to which the trypanosome showed no resistance [From data supplied in the tables, it appears that Glossina were fed on this patient between 15 Dec. and 26 Dec, 1932]

Strain H, Momfo Essa —A woman, aged 25, infected at Black River (Chenal) and diagnosed by gland puncture on 22 Aug, 1932, at this date the spinal fluid contained 48 cells per cmm From 22 Aug to 1 Dec, 1932, the patient was given 15 injections each of 2 gm. of tryponarsyl at irregular intervals. The trypanosomes did not disappear from the circulation. On 16 Dec., 1932, the blood contained parasites, and the spinal fluid 21 cells per cmm., and albumen 0·4. The trypanosome was equally resistant to Dn 12, a single dose of 0·25 gm. failing to sterilize the blood. From 7 Jan. to 25 Jan., 1933, she was given 6 injections each of 0·5 gm. of Dn. 12, and on 30 Jan. trypanosomes were numerous in the blood. [The table shows that flies were fed on this patient between 24 Dec., 1932, and 4 Jan., 1933.]

Details of all the transmission experiments performed on these 8 strains, and on two others, Kunku and Sanzala, concerning which no information is given, are set forth in a table, and the main facts summarized in a shorter table which is reproduced below.

It will be seen from this table that the only successful transmission experiments were those made with the last two strains. The number of flies used in the first two experiments is small, but the authors state that when the results are compared with those obtained with the last two strains, the former seem to be entirely non-transmissible. The next six attempts at transmission were made by feeding flies not on the patient, but on animals either inoculated directly from the patient or at least of an early passage. In none of these instances did the authors succeed in obtaining a biologically infected Glossina, although in some cases quite a number of gut infections were obtained (*vide* Table, Strains Boeke and Tassi Kikela). The authors discuss this interesting point at length; they consider their findings support DUKE's contentions that certain strains are non-transmissible. They furthermore draw the important conclusion that a single mechanical passage (by means of the syringe) of a trypanosome from a patient to a guineapig may suffice to render the trypanosome, whether it be arsenic resistant or not, completely non-transmissible. [There is, of course, no proof that it was the transference of the strains to guineapigs which produced this result.]

Interesting details are given of the tests made on the two strains which were transmitted; these were as follows :—

Strain G, Bernard Lisala.—A monkey infected by the bites of the Glossina which had been previously infected from the patient showed trypanosomes in its blood for the first time on 24 Jan., 1933. On 27 Jan. it was given 7 cgm. per kilo of tryponarsyl: trypanosomes disappeared. A guineapig which also became infected on 24 Jan. was given on 27 Jan. rather more than 10 cgm. of tryponarsyl per kilo: trypanosomes disappeared. Another guineapig which became infected on 1 Feb. received on 9 Feb. 7 cgm. per kilo of tryponarsyl and failed to become negative within 48 hours.

From these data the authors conclude that the resistance of this strain after transmission was approximately 7 cgm. of tryponarsyl per kilo., which they state represents 3·5 to 4·0 gm. for a medium sized negro. [? A warrantable assumption.] It is considered that this strain was by way of becoming resistant before and after transmission.

Strain H, Momfo Essa.—A guineapig, which became infected on 27 Jan. was given on 9 Feb. 15 cgm. of tryponarsyl per kilo.; its blood did not become negative until 12 Feb. Another guineapig which also became infected on 27 Jan. was given the same day 10 cgm. of tryponarsyl per kilo.; the blood remained positive until 7 Feb. when it was given a dose of 25 cgm. per kilo without the blood becoming negative.

Source of strain. *T. gambiense.*	Date of experiments.	Total number of flies dissected.	Total number of flies infected.	Percentage of infections.	Number of infected flies alive on the 15th day.		Index of transmissibility.
					With glands infected	Total	
Kunku ...	29.12.31 to 29.2 32	36	0	0	0	0	0
Sanzala ...	29 12.31 to 12 2.32	45	0	0	0	0	0
Cobaye Tshéla	15.1 32 to 16.8.32	301	2	0·66	0	0	0
Singe 4 Tshéla	16.6.32 to. 16.8.32	98	0	0	0	0	0
Cobaye Goma	9.8 32 to 6.10.32	95	0	0	0	0	0
Cobaye Ikongo Vivina	14.8.32 to 22 10 32	46	1	2·18	0	0	0
Cobaye Boeke	7.11.32 to. 19 1 33	110	27	24·53	0	16	0
Cobaye Tassi Kikela	29.11 32 to 19.1 33	161	35	21·7	0	12	0
Lisala Bernard	15 12.32 to 31 1 33	169	17	10	5	8	6·28
Momfo ... Essa	24.12 32 to 8.2.33	*160	23	14·3	6	16	5·4
		†160	14	8·7	6	7	7·5

* Index calculated after taking account of all late infections communicated at the end of the experiment by the animal serving to maintain the flies (guineapig) and to which the infections had been transmitted.

† Index calculated after eliminating this source of error.

From these experiments the authors conclude that tryponarsyl-resistance in *T. gambiense* is preserved after cyclical passage through *Glossina palpalis.* [It is unfortunate that the authors' evidence was not a little more precise. It would have simplified matters had they infected guineapigs from these patients, Bernard Lisala and Momfo Essa, before the transmission experiments and ascertained precisely the degree of resistance of the strains in these animals at this time. They could then have compared with these the data they obtained with the guineapigs infected by the cyclically infected Glossina, and by this means have decided beyond all doubt whether the strains had changed as the result of passage through the fly. There seems, however, no reasonable ground for doubting that the transmitted strains—particularly the second—were definitely resistant, and that the authors have in fact succeeded in demonstrating that tryponarsyl-resistance in *T. gambiense* is transmitted through *Glossina palpalis*. This work confirms that of the reviewer and his colleagues, which presumably the authors have not seen, as they do not refer to it; this *Bulletin*, Vol. 30, p. 448]. *W. Y.*

BARLOVATZ (A.). Une démonstration statistique de la transmissibilité à l'homme de trypanosomiase résistante au tryponarsyl. [**Transmissibility to Man of Trypanosomes Resistant to Tryponarsyl.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 623–632.

After a preliminary discussion of certain recent literature relating to the subject of arsenic-resistance, details are given of 9 cases in the Tobi-Lushiko sector of the Belgian Congo, which were found to have arsenic resistant infections at the time of treatment in 1932

At the commencement of his paper Barlovatz states that the work of the reviewer and his colleagues has shown that resistance of trypanosomes to tryparsamide implies resistance to other pentavalent arsenicals, but not to trivalent arsenicals such as novarsenobillon; Barlovatz, however, found that his patients were also resistant to novarsenobillon. [Barlovatz has misunderstood the reviewer and his colleagues, who clearly showed that resistance to any of the aromatic compounds of arsenic or antimony implies resistance to all the others—pentavalent, trivalent or arsenobenzol compounds.]

The results obtained by the reviewer in the production of resistant strains of trypanosomes by exposure of the parasites to various concentrations of arsenicals *in vitro* appear to explain the high degree of resistance exhibited by certain patients seen by Barlovatz at Mayumbe, where, since 1922, the standard courses of both atoxyl and tryparsamide have been very large. Barlovatz showed by injection of guineapigs that these patients were resistant to treatment because they were infected with resistant parasites.

Six of the nine cases of which details are given and on which most of the author's argument is based were from the village of Shakasumbi in the Tobi-Lushiko sector. This sector had previously been visited only once in 1929 by two native sanitary agents, who administered to the sick a standard course of 24 gm. of tryparsamide. As there is neither mission nor hospital in the district, there has been a minimum of medical intervention.

Details of the first case, which can serve fairly well as a type of the lot, and which probably infected the others, are as follows:—

Muenze ♀, 30 yrs. Treated in 1929 by sanitary agent with 10 doses each of 2 gm. tryponarsyl, because she was a suspected case of sleeping sickness (puncture negative). On 21.8.32: gland puncture +; lumbar puncture 3·2 lymphocytes, albumen normal; given on 21.8.32 tryponarsyl 1 gm., 30.8.32 tryponarsyl 1·8 gm. and 31.8.32 tartar emetic 6 cgm. Lost to sight (as were also the other cases, during the author's absence) up to 8.10.32, when she was given a regular course of 2 gm. doses of tryponarsyl per week up to a total of 15 gm. The course finished on 27.11.32, and on Dec. 2nd the blood was found to be positive by the triple centrifugation method ; glands negative. Moranyl was then given.

Shakasumbi contained 24 inhabitants (10 men, 9 women, and 5 children). When examined on Aug. 1932, there were found :—5 old cases treated in 1929, of which one (Case 1) had trypanosomes in the glands in 1932 ; 4 new cases (Cases 3–6) with positive glands and two new cases recognized by lumbar puncture (Case 2 and another, who responded well to tryponarsyl). Except for the last case all the patients of this group were resistant to tryponarsyl—a coincidence which could hardly be attributed to pure chance.

The author draws particular attention to the fact that in all these cases treatment was suspended for 31 days (owing to his absence) after the first three injections of tryponarsyl had been given. He inquires whether this fact had anything to do with the failure to cure by the subsequent doses, and as the result of certain considerations, which are stated in detail, he concluded that it had not. He observes that three of the most typical cases were resistant before the interruption of the treatment. Experience has shown that in the treatment of native cases a positive gland puncture, after 2 injections of tryponarsyl, is not found more than once in 35 cases, and that probably this figure is too high. Three of 4 cases of Shakasumbi were positive after 2 injections.

Attention is drawn to the interesting fact that in 7 of these 9 resistant cases the cerebrospinal fluid was normal. *W. Y.*

SCHWETZ (J.). Sur un cas de trypanosomiase (humaine) arsénico-résistante. [**Case of Arsenic Resistant Trypanosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. June 30. Vol. 13. No. 2. pp. 211–213.

An account is given of a case of sleeping sickness which proved resistant to tryparsamide, but which was subsequently cured by Fouadin (antimosan).

The patient was a woman, 25 years of age, who was recognized as infected at Thysville (Stanleyville District) on 5 October, 1931. She was given a course of treatment consisting of 12 weekly injections, each of 5 gm. of tryponarsyl ; on 31 Dec. a gland puncture was positive. The treatment was then repeated and up to 16 April, 1932, she had received another 32 gm. of tryponarsyl. On 19 April, lumbar puncture showed the spinal fluid to be practically normal (lymphocytes 3·2, albumen 0·18). She was then repatriated to Stanleyville and treatment continued ; from 24 May to 30 July, 1932, 9 further injections of tryponarsyl were given.

On 22 August she was sent to the laboratory for examination. Numerous large cervical glands were found, and on puncture of one of them trypanosomes were found to be numerous, the blood was negative. Lumbar puncture showed the spinal fluid contained 1·2 lymphocytes per cmm. The general condition was excellent.

On 24 August the patient was given a course of antimosan. The first dose was 1·5 cc., the second 3·0 cc., and the remaining doses 5·0 cc. By 12 Sept. she had received 45·0 cc. The glands became negative in a few days and the patient was apparently cured by the course.

RODHAIN in commenting on this case compared it with certain cases recorded by BARLOVATZ, in which apparent arsenic-resistance was associated with normal cerebrospinal fluid. It seemed to him that although in these cases tryparsamide was unable to sterilize the infection, it had nevertheless succeeded in preventing the invasion of the central nervous system. *W. Y.*

HOARE (C. A.) & COUTELEN (F.). Essai de classification des trypanosomes des mammifères et de l'homme basée sur leurs caractères morphologiques et biologiques. [**Classification of Trypanosomes of Mammals and Man.**]—*Ann. Parasit. Humaine et Comparée.* 1933. May 1. Vol. 11. No. 3. pp. 196–200. With 1 folding table.

The essential portion of this paper consists of a useful table, which not only classifies the trypanosomes of mammals, but summarizes all their main characters, *e.g.*, the chief morphological characters, their vertebrate and invertebrate hosts, their geographical distribution, and their pathogenicity for laboratory animals.

The genus is divided into two main groups having the following characters :—

Group A.—Blepharoplast non-terminal ; posterior extremity effilated and pointed ; usually of large size ; in the intermediate host the infectious stages are found in the posterior intestine, and transmission is by contamination with the faeces ; the trypanosomes are of little or no pathogenicity and are easily cultivated. This group is called by the authors the *lewisi* group, and contains in addition to this trypanosome, *T. theileri*, *T. melophagium*, *T. theodori*, and *T. cruzi*.

Group B.—Blepharoplast terminal or sub-terminal. In the invertebrate host the infectious forms are found in the proboscis or salivary glands, except in the *T. evansi* sub-group, where there is no cyclical evolution ; transmission is by inoculation, except in the case of *T. equiperdum*, where the infection is spread by coitus ; the trypanosomes are pathogenic and can only be cultivated with difficulty if at all. This group is divided into two divisions, according to whether the trypanosomes are monomorphic or polymorphic ; the latter division consists of the *brucei* group in which in the invertebrate host the infective forms are found in the salivary glands. It contains *T. brucei*, *T. rhodesiense* and *T. gambiense*. The monomorphic division is divided into two subdivisions, according to whether the flagellum is free or not free. The latter subdivision consists of the *congolense* group in which the infected forms are found in the proboscis of the invertebrate host ; this subdivision consists of *T. congolense* and *T. simiae*. The subdivision with a free flagellum is again subdivided into a group with a pointed posterior extremity, in which there is no development in the intermediary host and transmission is mechanical or by contact. This is called the *evansi* group and consists of *T. evansi*, *T. equinum*, and *T. equiperdum*. In the second group the posterior extremity is rounded and development in the intermediate host is limited to the proboscis. This consists of *T. vivax*, *T. caprae*, and *T. uniforme*. *W. Y.*

BRAZZAVILLE. Rapport sur le fonctionnement de l'Institut Pasteur de Brazzaville pendant l'année 1931. [**The Work of the Brazzaville Pasteur Institute in 1931.**]—105 pp. 1932. Brazzaville : Gouvernement Général de l'Afrique Équatoriale Française.

This notice deals only with human trypanosomiasis.

In the year under review of 69,108 natives examined for trypanosomiasis 195 were found infected ; 93 of these were discovered on tours of inspection, 85 because they were ill, 10 had applied for permission to travel by boat, and 7 were discovered because they desired an engagement. In addition to the 195, 763 old cases were treated and 80 suspects. The fatality rate in the year was 2·2 per cent. A table shows the number of Europeans infected yearly for 18 years, 92 in all or an average of 5·1 a year. A second table shows the numbers of natives examined yearly since 1910 and the number of diagnoses of trypanosomiasis : the proportion of infected has fallen steadily from 7·4 to 0·2 per cent. (the number of examinees has risen 17 fold). It is stated that 32 per cent. of persons recognized to be infected at Brazzaville do not show trypanosomes except in the cerebrospinal fluid ; they have passed the lymphatic and blood stage before they reach the doctor ; consequently routine examinations for trypanosomiasis are rarely positive. Probably such persons would have parasites intermittently in the circulation and would be capable of infecting tsetse. A table shows that whereas between 1914 and 1924 when treatment was by atoxyl, tartar emetic, and novarsenobenzol, the yearly fatality averaged 36 per cent., in 1925–31 when tryparsamide and Fourneau 270 were used, it averaged 11·5 per cent. ; this refers to the treatment centre where only severe cases are admitted. Of all persons infected, as stated above, the fatality was 2·2 per cent. Of the patients treated in 1931, 88 were at the first stage, and 107 at the second. Of the 1st stage treatments 96 per cent. were successful and of the 2nd stage 72 per cent. [but the period of observation is not stated].

Of 758 old cases examined and treated in the course of the year 70 or 9·2 per cent. have relapsed and 17 have died ; 14 had a blood relapse and in one there was, in the author's opinion, a genuine arsenic resistance. Blood relapses after tryparsamide treatment were treated by Fourneau 270 and in nearly all blood sterilization was obtained ; the author considers this to be the best arsenical trypanocide 30 had a nervous system relapse, and in 20 of these treatment caused the albuminosis of the C.N.S. to return to normal. In 3 instances reinfection occurred.

The report deals also with the usual activities of the Institute [see this *Bulletin*, Vol. 29, p. 178]. *A. G. B.*

COGHLAN (B. A.). **Notes on One Hundred and Ten Cases of Rhodesian Sleeping Sickness, with Special Reference to Prognosis and Treatment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. June 29. Vol. 27. No. 1. pp. 67–84. [12 refs.]

Details are given concerning the results of treating two groups of Rhodesian sleeping sickness patients, comprising 110 cases, with a mixed treatment of Bayer and tryparsamide, and the symptoms are studied with a view to prognosis.

Group I (47 cases) were given 5 gm. of Bayer 205 (1 gm. at weekly intervals) followed after 1 month's rest by a course of at least 20 gm. of tryparsamide (3 gm. at weekly intervals). Group 2 (63 cases) were given 3 gm. of Bayer 205 (1 gm. every alternate day) followed after a week's interval by a course of 10 gm. of tryparsamide (3 or 4 gm. at weekly intervals). These two treatments, the author states, are fairly representative of the course given to sleeping sickness patients to-day. The former he designates as "prolonged thorough treatment" and the latter as a "short intensive treatment." The inquiry was primarily undertaken in order to try and gauge the prognostic outlook for sleeping sickness patients and to ascertain the relative value of various signs in influencing this outlook.

The most common signs of Rhodesian sleeping sickness in their order of frequency are adenitis, oedema, tremor, enlarged spleen, loss of flesh, and pronounced weakness.

The period at which the patient comes to hospital for treatment has, of course, a big influence on the development of the commoner signs ; *e.g.*, oedema, tremor, and enlarged spleen may not have time to develop if treatment is begun early enough, but, as in the present series of cases 4 weeks was the average time which had elapsed from the onset of symptoms, a number of signs were present in the majority of cases. The author takes each of these signs in turn and tries to show its significance in prognosis. The results are summarized in a series of tables. For example, adenitis is first considered, and the patients of each group are classified according to whether or not adenitis was present. In Group I, 36 patients had adenitis at the time of treatment, and 47·1 per cent. were dead in 3 years ; 11 patients of this group did not exhibit enlarged glands, and 72·5 per cent. were dead in 3 years. In Group 2, 58 cases had adenitis, and 51·6 per cent. were dead in three years ; 4 cases did not have enlarged glands, and 100 per cent. were dead in 3 years. These results, in the author's opinion, tend to show that adenitis is a favourable sign. In the same way he deals with oedema, which he considers to be a bad sign, tremor, which is stated to have little significance on prognosis, and enlarged spleen, the significance of which it is difficult to assess on account of malaria in the district. As regards wasting the author writes, " when wasting is present to a noticeable degree, and the patient attends regularly during the prolonged period necessary for Treatment No. 1, the prognosis is not influenced by this sign, but when the patient fails to attend regularly, and as a result only receives partial treatment or Treatment No. 2, then his outlook is definitely adversely influenced and he stands only one chance in six of making a complete recovery." The same is said to be true with regard to weakness.

In two lengthy tables details are given concerning each of the 110 cases treated. From these tables it is seen that of the 47 cases comprising Group I given the " prolonged thorough treatment," 22 were quite fit at the end of the 4th year, and of the 63 cases comprising Group 2, who received the short intensive course, 23 were fit at the end of the 4th year. From this the author concludes that " prolonged thorough treatment " with Bayer and tryparsamide gives better results than " short intensive treatment " with these drugs. The author points out that he believes that if a patient remains well for a period of 3 years after the conclusion of treatment, he seldom, if ever, relapses later. Among the records of 410 cases to which he had access, he could only find one instance in which a patient had relapsed for the first time later than 3 years after the end of treatment.

The author next passes to a consideration of the influence exerted by the condition of the cerebrospinal fluid, and in a table his cases of each group are classified according to whether the number of cells in the cerebrospinal fluid was greater or less than 20 per cmm. In Group I, 24 patients had a cell count greater than 20, and 70·8 per cent. were dead in 3 years ; 13 had a cell count less than 20, and only 22·9 per cent. were dead in 3 years. In Group 2 the corresponding figures are 62·3 per cent. and 33·2 per cent.

As a result of his survey of the data recorded in this paper, the author considers certain signs are of paramount importance when trying to reach a prognosis in any case. These signs in order of importance are :—

1. The condition of the cerebrospinal fluid as ascertained by lumbar puncture.
2. The presence of pronounced, observable weakness.
3. Definite loss of flesh.
4. The presence of oedema.

[It seems to the reviewer, as the result of critical study of Coghlan's tables, that it is doubtful whether some of his conclusions are justifiable in view of the small number of cases which fell into some of his classes.]

W. Y.

LAQUIEZE & BERNY. Note sur onze observations de trypanosomés atteints de frigidité génitale. [**Sexual Impotence in Trypanosomiasis : Eleven Cases.**]—*Ann. de Méd. et de Pharm. Colon.* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 96–100.

Details are given of eleven cases of trypanosomiasis who exhibited sexual impotence, and on consideration of these cases the authors have drawn certain conclusions. In an endemic area, when a native complains of impotence without any of the usual causes, one should think of trypanosomiasis ; sometimes, even if examination of the blood and gland juice is negative and the cerebrospinal fluid is unchanged, treatment with tryparsamide will give excellent and permanent results. Stress is laid on the fact that a patient suffering from impotence is not necessarily an advanced case of the disease. Three of the eleven cases were in excellent condition and had normal spinal fluids.

Sexual frigidity is, in the author's opinion, a good sign of trypanosomiasis and is apparent in 2 per cent. of cases about 1 to 1½ years after infection. Treatment with tryparsamide gave excellent results.

W. Y.

LAQUIEZE & BERNY. Note sur l'arrêt des menstruations chez les trypanosomées. [**Arrest of Menstruation in Trypanosome Infections.**]—*Ann. de Méd. et de Pharm. Colon.* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 100–101.

The authors have re-investigated the question of the effect of trypanosomiasis on menstruation. They have examined the point in respect of 140 women (sexually mature and non-pregnant) ; of these 93 were in the first stage of sleeping sickness and 47 in the second stage. Among the first group 84 menstruated regularly, and in 9 (10 per cent.) menstruation had ceased ; in the second group 36 menstruated regularly and in 11 (24 per cent.) it had ceased. Menstruation frequently returned quickly as the result of treatment, usually 2 injections of atoxyl or Fourneau 270 sufficing. *W. Y.*

CHAMBON. Trypanosomiase humaine observée chez un enfant âgé de cinq jours. [**Trypanosomiasis of a Five-Days-Old Baby.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 607–608.

A child 5 days old was found on 15th October, 1926, to be infected with trypanosomes; it was born in the village of Mboumo, Cameroons.

The inhabitants of this and neighbouring villages were at that time heavily infected with trypanosomiasis, *e.g.*, Nemayong 69·8 per cent., Mboumo 79·2 per cent., Eko 77·9 per cent. It is noted that the mother was 28 years of age, had been found to be infected on 15 June, 1925, by DE MARQUEISSAC, and that she had been given an injection of 1 gm. of atoxyl and had then disappeared. Reference is made to other cases of infection in very young children. JAMOT recorded a case in a child of 12 days and LE ROUZIC, MONTESTRUC and MONTALIEU discovered three cases in infants aged 10, 12 and 9 days, respectively.

In the discussion which followed this note, CAZANOVE pointed out that FABRE found trypanosomes in the blood of a few days' old child of an infected mother. LEGER cited several somewhat similar cases. KELLERSBERGER agreed with Chambon that in cases like those described, one had to consider the possibility of intra-uterine infection.

W. Y.

LAQUIEZE & BERNY. La parfaite tolérance du noir pour la ponction lombaire et sa réalisation très pratique dans un secteur de prophylaxie en A.E.F. [**Tolerance of the Negro to Lumbar Puncture.**]—*Ann. de Méd. et de Pharm. Colon* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 93–96.

This is a plea for the regular employment of lumbar puncture as a means of diagnosis, and as an aid to treatment, in trypanosomiasis. Between 1st Aug., 1930, and 30th Sept., 1932, no less than 2,715 punctures have been made during sleeping sickness work in Sector 12b Nola (Middle Congo) Although about a third of these were done in the bush not a single accident occurred, and the procedure was well tolerated by the natives and readily accepted by them as a necessary part of their treatment. *W Y.*

BARLOVATZ (A.). Les rachicenthèses capillaires [**Rachicentesis with a Fine Needle.**]—*Bruxelles-Méd* 1933. Mar 26. Vol 13. No. 21. pp. 583–585.

In this note the author advocates the use of fine needles for lumbar or sub-occipital puncture, mainly on the ground that there is less trauma.

The needles ordinarily used for lumbar puncture are 1 mm. in diameter, *i.e.*, about 0·78 sq. mm. With a needle of 0·6 mm. diameter the figure falls to 0·28 sq. mm., with one of 0·5 mm. to 0·2 sq. mm., and with one of 0·4 mm. (the finest used by the author) to 0·13 sq. mm. The relation of the surface is then 19 : 7 : 5 : 3.

Practically it is impossible to assess the reactions following the use of the different sized needles, but Barlovatz points out that most of his punctures are done on ambulant cases who are not drugged, and who frequently return home, sometimes travelling considerable distances the same day. As a rule the reaction is absolutely nil, but occasionally, even when a needle of 0·5 mm. diameter is used, he has seen violent reactions. Similarly he has never observed any severe symptoms on sub-occipital puncture, most of the patients make no complaint. Hitherto he has made some 10,000 lumbar punctures and more than 4,000 sub-occipital punctures. Among the former he has had no deaths and no untoward symptoms lasting more than a few days. The lumbar puncture in the bush, provided it is made with a fine needle, is no more dangerous than an intravenous injection.

In his earlier sub-occipital punctures the author used needles of 0·9 mm. in diameter and with a long bevel. With such needles he has had two very severe meningeal haemorrhages, and one immediate fatality in a child. It is noted that puncture of the bulb in animals is frequently immediately fatal When, however, he used a small needle of 0·5 mm. diameter he had no untoward results, even though the nervous centres were punctured. He asks why the nervous tissue is so often punctured and states that the reason is that the directions given in the classical books are quite inexact, at least for the Congo native. The nervous tissues instead of being 5 cm. below the skin in a good puncture are 4 cm. or less, and as a rule in the adult the fluid is obtained when the needle is inserted 3–3·5 cm. With very fine needles it is necessary sometimes to aspirate with a syringe.

Which method is to be preferred, the sub-occipital or the lumbar puncture ? The former is the more easy, and it is not attended by any subjective phenomena, but it has the disadvantage, especially when a large needle is used, that the fluid is often contaminated with blood ; in order to get sufficient pressure the patient must be lying down at the time of sub-occipital puncture, and the process of obtaining the fluid with a fine needle is even then very slow, sometimes 10 mins. is required for 5 cc. of fluid. Lumbar puncture provides the fluid more rapidly and rarely contaminated with blood. Which of the two procedures gives the more significant results is not easy to say. Sometimes the fluid taken at the two levels is identical, but sometimes there are great differences. A discussion of the reasons for this are beyond the scope of this work. *W. Y.*

RAMOS (A. Silveira). Tratamento dos estados avançados da doença do sono pelas injecções intra-carotidianas de medicamentos tripanocidas. [**Sleeping Sickness in Advanced Stage treated by Intracarotid Injection of Drugs.**]—Reprinted from *Med. Contemporanea.* 1933. Mar. 5. Vol. 51. No. 10. pp. 63–66.

The author cites cases of sleeping sickness in the later stages in which rapid improvement followed intra-arterial injection of tryparsamide or Bayer 205. Before trying the method on human beings, he experimented with dogs and found that they stood large doses and high concentrations perfectly well—4·8 gm. (10 cc. of a 48 per cent. solution) of tryparsamide in a dog of 12 kgm.

For the first injection given to a man he exposed the carotid under anaesthesia, but not for subsequent injections to this patient nor to any others. The patient lies on his back with head turned a little to the side opposite to that selected for injection ; the site of election is the lower level of the larynx at the anterior border of the sterno-cleido-mastoid. The patient is as a rule too ill to mind the slight manipulation required. The artery is pressed against the larynx, or better the transverse process of a cervical vertebra, and must not be relaxed until the injection is finished, and this should be given very slowly. The doses used were from 1–3·5 gm. Six cases are detailed, one of which may be quoted as an example :—

J. M., male, 42 years, very somnolent, almost comatose, does not reply to questions ; no desire for food , enlarged glands in anterior and posterior triangles, knee jerks exaggerated ; incontinence of sphincters. Trypanosomes in c.s.f. ; albumen present in spinal fluid 1 gm. per litre, lymphocytes

160 per cmm. Photophobia, retinal anaemia. Tryparsamide 1 gm. in 3 cc. injected into the right carotid (Oct. 23rd, 1931) without any untoward symptoms. Ophthalmoscopic examination an hour later showed the same conditions. The next day no trypanosomes were seen in the spinal fluid; there was less photophobia and on 25th Oct. the retina was less anaemic and two days later was " obviously better." On 28th clinical state as before. On 29th 3 gm. tryparsamide in 10 cc. water injected into left carotid. Immediately after, the pupils dilated, the pulse became thin, uncountable, but irregular, with general state of collapse [This was ascribed to the injection being made too rapidly; it soon passed off completely.] On 30th the general condition was much better, control of sphincters returned, he began to reply to questions, was able to take food, and could walk, but reeled. The eye condition was better. December 5th " general state excellent," felt well, enjoyed his food and walked normally. C.s.f. albumen 0·56 per litre, lymphocytes 17 per cmm., no trypanosomes seen. December 9th 3 gm. tryparsamide in 10 cc. water injected into right carotid, bore it well. January 22nd, 1932, vision normal, general state excellent, c.s.f. albumen 0·35, lymphocytes 12 per cmm. Left hospital showing no symptoms.

The author concludes :—

1. After intra-carotid injection of tryparsamide trypanosomes disappear from the blood [they did so in other patients] and the cerebrospinal fluid; nervous and mental symptoms disappear and the spinal fluid becomes more normal.
2. The procedure needs no special preparation and can be carried out even in the bush (em plano mato).
3. Injection can be repeated on the same side.
4. No untoward symptoms or ocular lesions resulted; slight circulatory retinal changes might be seen but without any damage to vision.
5. Though not excluding subcutaneous treatment, in patients in whom a speedy and safe effect on the encephalitic symptoms is called for the intra-carotid route is indicated. *H. H. S.*

LAUNOY (L.). Nouveaux documents statistiques pour servir à l'étude du mécanisme de l'action trypanocide du 205 Bayer-309 Fourneau. [**Mechanism of Trypanocidal Action of Bayer 205.**]—*C. R. Soc. Biol.* 1933. Vol.. 113. No. 19. pp. 276–279.

This paper records further observations made with the object of throwing light on the mechanism of the trypanocidal action of " Bayer 205 " [*ante*, pp. 114; 445].

A series of mice were inoculated at intervals from 2 to 24 hours from mice which were infected with *T. congolense* and had been treated with " Bayer 205 " (0·0025 gm. and 0·005 gm. per 20 gm. mouse). A proportion of each set of subinoculated mice became infected up to 24 hours after treatment of the original mice. Somewhat similar results had been previously obtained by the author and PRIEUR with mice infected with *T. brucei*. In the case of mice inoculated from infected rabbits and cats infections were only obtained up to 1 or 2 hours after treatment.

With the object of going deeper into the matter careful observations were made regarding the incubation period and length of life in the 27 mice which became infected when inoculated from the *congolense* infected treated mice. The results obtained show that the probability of survival during the first 10 days is greater than in mice infected with the normal untreated strain, but that the probability of mortality in the first 25 days is approximately the same in both groups.

The author next passed to an examination of the virulence of the relapse strain obtained from mice which had relapsed after treatment with " Bayer 205." All the subinoculated mice became infected, but the infections showed the same characters of diminished virulence.

W. Y.

LAUNOY (L.) & ANCELOT (A.). Sur l'intérêt de la thérapie synergique étiologique (trypanocide). Nouvel exemple de son application.—[**Treatment with Combined Drugs (Synergy) in Trypanosomiasis.**]—*C.R. Soc. Biol.* 1933. Vol. 113. No. 24. pp. 871–873. [11 refs.]

Experiments are described indicating the advantages to be obtained from combining an antimonial preparation with " Bayer 205 " in the treatment of mice infected with *T. congolense.*

In the first series of experiments 25 infected mice were treated with a mixture consisting of 0·005 gm. of " Bayer 205 " and *70γ of Sb (antimony biopyrogallol-o-acetate of sodium). The blood of all of these animals was sterilized in 24 hours and only one relapsed. When the dose of the antimonial was decreased to 56γ, it was found that 12 of 15 mice were cured and three relapsed. A series of subinoculations were made after treatment to ascertain how long the heart blood remained infective. The subinoculations were always positive up to the 19th hour after treatment, but between this time and the 24th hour the results were irregular. When the doses of the drugs were increased slightly, analogous results were obtained, but rather more speedily. It is pointed out in conclusion that the antimonial preparation alone had but little action. *W. Y.*

DUBOIS (A.). A propos de l'association Bayer 205 et émétique. [**Association of Bayer 205 and Tartar Emetic.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. June 30. Vol. 13. No. 2. pp. 143–147.

The author has studied the favourable results obtained by combining tartar emetic with Bayer 205 with the object of throwing light on the mechanism of the phenomenon. His technique was eventually the same as PIERAERTS [see this *Bulletin, ante*, p. 115].

Rats infected with *T. tumba* were treated with moderate doses of Bayer 205 (1 cgm. per kilo) ; in certain cases the animals were cured and consequently the experiment failed ; but in the majority parasites were still present after 24 hours and rats were subinoculated, and then after some days at the time of relapse other passages were made and the first rat treated with tartar emetic. This should normally lead to the cure of the Bayerized rat in accordance with previous observations. In order to see whether the subinoculated rats had modified infections some were kept as controls and others treated with tartar emetic.

A number of experiments are given in detail from which it appears that the Bayerized rats themselves were sometimes cured by the subsequent dose of emetic, but the subinoculated rats were not cured by this drug. From this the author concludes that the activity of the Bayer-emetic association is a case of synergic medication, which cannot be explained by a modification of the parasite. It is without doubt due to the presence of small quantities of Bayer in the circulation of the host which suffice to activate the tartar emetic. *W. Y.*

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*γ=0·001 mgm.

POTTIER (R.) & VAN DEN BRANDEN (F.). Note au sujet du tryparsamide ou tryponarsyl (glyphénarsine de la P.B. IV). [**Brands of Tryparsamide. Tests for Toxicity.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. June 30. Vol. 13. No. 2. pp. 187–197.

The authors point out that there are now on the market quite a number of brands of tryparsamide, and that these probably vary in purity and in toxicity. In the present work they have compared the toxicity of certain samples and describe what they regard as a standard technique for determining the toxicity of any sample of the drug.

It is noted that LAUNOY and ENGLER of the Rockefeller Institute give the lethal dose of tryparsamide for the rabbit as 0·9 gm. per kilo., and that they state that the dose which should be tolerated is 0·75 gm. per kilo., no more than 40 per cent. of the animals dying within a period of 7 days. When the observation was extended to 30 days LAUNOY and ENGLER found that doses of 0·85 gm. per kilo. gave 100 per cent. of mortalities, and doses of 0·75 gm. per kilo 50 per cent. of mortalities.

In previous work one of the authors had found that good samples of tryponarsyl (Meurice) and tryparsamide (Poulenc) were tolerated in doses of 0·75 gm. per kilo., and that all the rabbits survived for 7 days. It was therefore determined to ascertain the effects of larger doses. Four brands of the drug were tested , the two above mentioned and also novatoxyl (Erich Boehden et Cie) and trypotan (Bayer). It was found that in each case the majority of animals survived a dose of 1·0 gm. per kilo. and that no difference could be discovered between the various brands.

In further experiments the dose was increased to 1·25 gm. per kilo. and all the animals survived the 7 days' observation ; no difference being seen between tryponarsyl, tryparsamide (Poulenc) and tryparsamide (Powers of Philadelphia). It was eventually found that the dose of tryponarsyl which gave 100 per cent. of deaths was 2·5 gm. per kilo. It thus appears that the tolerated dose and the lethal dose are much higher than those given by American and French authors This fact is of importance in testing samples of drugs. For example, some time ago van den Branden examined a number of samples of tryparsamide which had been in the Congo for years ; some of them had become slightly yellow in colour. He found, however, that rabbits tolerated 0·75 gm. per kilo. of all the samples, and consequently concluded that they had undergone no increase in toxicity [*ante*, p. 116]. In light of his recent observations he re-examined two of these samples and found that although rabbits tolerated as before 0·75 gm. of the drug, doses of 1·25 gm. per kilo. killed almost 100 per cent. It is clear therefore that they had actually become more toxic during their prolonged sojourn in the Congo, because the fresh samples were easily tolerated in doses of 1·25 gm. per kilo.

The authors then pass to a consideration of the practical details of toxicity tests, and finally lay down the following rules :—

The test should be done on 5 rabbits of between 1,750 and 2,250 gm. in weight. The animals should be of the same race and free from all obvious blemishes ; males or non-pregnant females should be used. They should be kept under observation for 15 days before the test to accustom the animals to the hutch; they should be carefully looked after, well fed, and kept properly warm in cold weather.

The dose of drug given should be 1 gm. to 1·25 gm. per kilo. of weight; it should be dissolved in 10 times its weight of distilled water, sterilized by boiling, and administered at 20° to 25°C. The solution should be injected slowly into the marginal vein of the ear. The animals should be kept under observation for 7 days, and during this time not more than 2 of the 5 should die; the remainder should be in apparent good health. Samples intended for human use should pass this biological test. *W. Y.*

BARLOVATZ (A.). Sur certains accidents de cures au tryponarsyl. [**Accidents in Tryponarsyl Cures.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 850–856.

The author draws attention to certain grave accidents—sudden death and blindness—which he has encountered in the treatment of sleeping sickness by tryponarsyl during the year 1932.

The drug used was several years old; the exact age is unknown, but it was certainly more than 2 years, which is the period for which the product is guaranteed. It was stored in a suitable place—dark, sufficiently ventilated and at a temperature usual for well-built houses in the tropics. All the injections were made in the author's presence; he prepared the solutions (20 per cent.) himself, and the injections were made by native assistants. The usual dose was 2 gm. or less. In this paper the author confines himself to the grave accidents.

Deaths.—Certain solutions produced in the majority of patients rapid untoward results. In an hour or two the patients suffered from marked stiffness of the limbs, from pain in the kidneys, and sometimes from headaches; often there are tremors and sometimes rigors and certain patients vomit. In slight cases these signs are transient, but in severe cases they may last for some days. Sometimes these symptoms do not subside and the patient dies in 24 to 72 hours, the fatal issue being often preceded by bloody vomit and motions. Of 1,700 patients treated with an average of 17 injections there were 22 rapid deaths undoubtedly due to the drug. Barlovatz then passes to a consideration of the technique as a possible cause of these catastrophes, *e.g.*, the purity of the water, sterilization of water and syringe and so forth, but he cannot explain the fatal results on any of these grounds. Nor are the hypotheses that death resulted from a toxaemia due to the sudden destruction of large numbers of trypanosomes, or that the patients were in a bad state at the time of treatment, any more satisfactory.

Blindness.—The author limits himself to a consideration of those patients who became suddenly blind. He encountered in 1932 eleven such cases and in only two was there slight improvement after some months. Brief details are given of each. In 8 the nervous changes were very slight at the time of treatment and the 3 who were not punctured could not be grouped as somnolent cases. In only one case were the doses at all large, whilst in three they were very small.

It is recorded as perhaps significant that of 45 patients treated on 26th October all became ill, 6 died, 3 became blind and 2 suddenly developed bad sight. The solution employed on this occasion certainly seemed very toxic. Certain bottles then contain a factor which produces blindness and which kills. It is noted that some of the bottles contained fine powder, others large crystals, the volume of the same weight of the drug varying greatly. The normal white colour had in certain bottles changed to a yellow or rose colour, but such bottles were always rejected. Among the white specimens remaining there seemed to be no relation between the physical character and the toxicity. It is stated that death followed the injection of 1·4 gm. in a young patient who had previously tolerated several doses of 2·0 gm.; all the patients injected with this particular solution suffered gravely. The drug, which looked perfectly good, came from a bottle which had been used with success two weeks previously; apparently, therefore, the change had occurred after the opening of the bottle. The explanation cannot be that one consignment was bad, because only some samples of many consignments were poisonous.

Barlovatz concludes that tryponarsyl which has been stored in Africa for more than 3 years may become dangerous and produce death and blindness. He points out that this conclusion differs from that of VAN DEN BRANDEN [*ante*, p. 116], who tested the toxicity for rabbits of old samples which had been kept for a long time in the Congo and concluded that they had not deteriorated. [In a more recent paper summarized in this number VAN DEN BRANDEN has modified his previous views]. *W. Y.*

TANON, LASSABLIÈRE (P.) & PEYCELON (A.). Valeur comparée du sérum animal et de l'eau distillée comme excipient de la tryparsamide.—**[Comparative Value of Serum and Distilled Water as Excipient of Tryparsamide.]**—*Rev. Méd. et Hyg. Trop.* 1933. Mar.–Apr. Vol. 25. No. 2. pp. 83–85.

Experiments were undertaken to ascertain whether the results obtained in treating guineapigs infected with *T. gambiense* with tryparsamide were better when the drug was given in serum than when it was given in distilled water. The results suggested that there was no difference. *W. Y.*

TANON, LASSABLIÈRE (P.) & PEYCELON (A.). Contribution expérimentale à l'étude, la valeur comparée de la tryparsamide et la tséamine dans le maladie du sommeil **[Comparative Value of Tryparsamide and Tséamine in Sleeping Sickness.]**—*Rev Méd. et Hyg. Trop.* 1933. Mar–Apr. Vol. 25. No. 2. pp. 81–82.

A few experiments were made on guineapigs infected with *T. gambiense* with the object of estimating the therapeutic value of "tséamine." The authors conclude from these experiments [which the reviewer regards as very unconvincing] that the action of tséamine is superior to that of tryparsamide. Further experiments show that the therapeutic action of tséamine is destroyed by heating. *W. Y.*

RODHAIN (J.), DUBOIS (A.) & HENDRIX (H.). Essais thérapeutiques de nouveaux composés antimoniaux dérivé de la quinoleine (Dn 9 à Dn 20 U.C.B.). **[Therapeutic Trials of New Antimonials derived from Quinoline.]**—*Ann. Soc. Belge de Méd. Trop.* 1933. Mar. 31. Vol. 13. No. 1. pp. 17–42.

This paper gives the results of testing certain new antimonial derivatives of quinoline, manufactured by the Union Chimique Belge, on laboratory animals infected with various strains of trypanosomes.

Four of the compounds, viz., Dn 9, Dn 12, Dn 17 and Dn 20, are pentavalent, and the remainder, Dn 7, Dn 8, Dn 11, Dn 14 and Dn 18, are trivalent. Various details regarding them, such as their chemical constitution, their antimony content, and their toxicity for rats, are given in tabular form. Reference has already been made to Dn 7 and Dn 9 in a previous paper [this *Bulletin*, Vol. 29, p. 297] and the present work relates mainly to observations on the other compounds. They were tested mainly in rats infected with *T. congolense, T. evansi, T. brucei, T. tumba* and *T. rhodesiense*; and the results obtained are summarized in a series of tables.

It was found that all the compounds had a definite trypanocidal activity, but that the degree of activity varied according to the infection. Sterilization was only obtained with doses bordering on the toxic and *T. congolense* proved to be the most sensitive parasite. It was difficult to distinguish between the trivalent and pentavalent compounds in respect of their trypanocidal activity; in fact, the pentavalent compound Dn 20 proved just as rapid in its action as did the trivalent compound Dn 18. Apart from Dn 9 and Dn 18 all the compounds were so irritating that they could not be given subcutaneously. *W. Y.*

FOURNEAU (E.), TREFOUËL (J.), M. et Mme., BOVET (D.) & KOETSCHET (Pierre). Chimiothérapie des infections à *Trypanosoma congolense*. Action élective des composés organiques polyarsenicaux. [**Chemotherapy of** *T. congolense* **Infections.**]—*C. R. Acad. Sci.* 1933. Apr. 18. Vol. 196. No. 16. pp. 1173–1175.

It is well known that *T. congolense* infections have always exhibited a marked resistance to the action of the organic arsenical compounds. The authors have found, however, that this is not really a case of arsenic resistance, but that there are actually a whole series of arsenical compounds which are active in this infection. This property is possessed by very numerous organic arsinic acids characterized by the fact that their molecule contains at least two arsinic acid groups. Further details will be published later, and in this preliminary note the authors content themselves by giving a brief summary of the compounds and an indication of their activity on *T. congolense* infections.

W. Y.

STEIN (L.). Ueber die Wirkung eines löslichen Wismutkomplexsalzes auf Trypanosomeninfektionen. [**On the Action of a Soluble Complex Bismuth Salt on Trypanosome Infections.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 5/6. pp. 489–496. [29 refs.]

Experiments were undertaken to test the value as a trypanocidal agent of a new soluble bismuth compound prepared by Rothmann of Berlin. The compound is the sodium salt of bismutho-dithiopyridin carbonic acid, the graphic formula of which is given: it is designated " R 141." It is a light yellow powder, readily soluble in water, gives an acid reaction with litmus and its bismuth content is about 40 per cent.

The drug was tested on mice infected with various strains (nagana, *T. equiperdum, T. equinum, T. rhodesiense, T. gambiense* and *T. congolense*). Although it had a favourable action it, as a rule, failed to cure; the best results were obtained by repeated small doses. It acted differently in the different infections and best with *T. congolense.*

W. Y.

NICOLLE (Pierre). Etude du pouvoir infectieux du sang et des organes de souris expérimentalement infectées par *Trypanosoma congolense* pendant la période de blanchiment qui suit l'injection de différentes doses de 205 Bayer-309 Fourneau. **[Infectivity of Blood and Organs of Mice infected with *T. congolense* after Injection of Varying Doses of Bayer 205.]**—*C. R. Soc. Biol.* 1933. May 5. Vol. 112. No. 16. pp. 1658–1660.

The object of the experiments described in this paper was to discover something about the distribution of the parasites responsible for the relapse in trypanosome infected mice treated with subcurative doses of " Bayer 205." Do the parasites completely disappear from the blood and take refuge in certain of the internal organs, and if so in which ?

It was found that when mice infected with *T. congolense* were given an intravenous injection of 0·002 gm. of " Bayer 205 " per 20 gm. of mouse, the parasites disappeared from the blood for 4 or 5 days, whilst, when the dose was increased to 0·004 gm., the time of disappearance was increased to 5 or 6 days. A series of experiments was performed in which infected mice were killed at various intervals after treatment, and their blood and emulsions of different organs—salivary glands, heart, lungs, kidneys, liver, spleen, ovaries, testicles and brain, were injected into healthy mice. The results of two such experiments are set forth in tables. From these tables it appears that after a dose of 0·002 gm. of the drug, although trypanosomes could not be detected by microscopic examination of the blood from the second to the fourth days, nevertheless subinoculation of the blood into fresh mice always produced infection. When the dose was increased to 0·004 gm. per 20 gm. mouse, microscopic examination of the blood was negative from the 23rd hour to the 5th day, and subinoculation of the blood into fresh mice failed to produce infection between the 31st hour and the 3rd day. Subinoculation of organ emulsions as a rule gave rise to infection, but sometimes failed to do so, especially about the time the blood was negative. The author is inclined to ascribe the infections following inoculation of organ emulsions as due to the small amount of blood they contained.

The question what happens to the parasite from the time the blood loses its capacity to infect fresh mice to the time of relapse is still left unsolved, but the author suggests that, as a practical measure in combined therapy, it would be as well to give the second drug some time (31 hours) after the " Bayer 205 " instead of giving both drugs about the same time. In other words that the second drug should be given at the period of maximum sterilizing effect of the " Bayer 205."

W. Y.

COLLIER (W. A.) & SEEGERT (J.). Die Bedeutung des Organismus für den chemotherapeutischen Heilungsvorgang. **[The Significance of the Host in Chemotherapeutic Cure.]**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 342–346. [19 refs.]

This paper lays stress on the importance of the host in chemotherapeutic processes. The author quotes extensively from the literature in support of his contention.

KOLLE showed that it was easier to cure rabbit syphilis at an early stage of the disease than later, and similar results were obtained by Collier and KRAUSE in trypanosomal infection of mice. Reference is made to the fact that blocking of the reticulo-endothelial system inhibits the action of drugs. The same drug acts differently in different animals, *e.g.*, the chemotherapeutic index of atoxyl in nagana infected mice is $\frac{1}{2}$ to $\frac{1}{8}$ and that of neosalvarsan $\frac{1}{80}$; in human trypanosomiasis atoxyl was good, but neosalvarsan of little use. [Undoubtedly this statement expresses the general view, but whether it expresses a fact is, in the reviewer's opinion, a matter of doubt. Atoxyl has been extensively used in sleeping sickness and much is known about its action ; the same cannot be said of neosalvarsan. To quote a single example, the results obtained by ZUPITZA (1920) in Togoland with neosalvarsan in 64 cases of sleeping sickness appear to have been dramatic (100 per cent. cured after an observation period of 11–19 months) [this *Bulletin*, Vol. 17, p. 328], and yet that observation seems to have attracted little or no attention. There are other examples of the abandonment of what seem to be most valuable drugs for little or no reason. Arsacetin in trypanosomiasis of laboratory animals is one of the most valuable of the aromatic arsenicals and yet it has never received a fair trial in man, probably because one of the few patients in whom it was used became blind. Yet atoxyl, which in laboratory animals seems to be a relatively very inferior drug, is extensively used, notwithstanding the fact that it has made countless patients blind. The reviewer merely calls attention to these facts in order to show how easily an "idée fixe" gets into the literature and remains there indefinitely, although it is based on little or no foundation of fact.] Quotations are made from PEARCE and BROWN and others showing that mice are cured by smaller doses of tryparsamide, antimosan, etc., than are rats and guineapigs.

The authors themselves, in their own experimental work, used three drugs, myosalvarsan, Fouadin, and Bayer 205, and they examined their actions on mice, guineapigs, and rabbits infected with the same strain of nagana. The mice were treated on the day after infection, and the guineapigs and rabbits on the 14th day of the infection. The drugs were always given subcutaneously. The results are summarized in the following tables :—

Myosalvarsan gm. per kilo.

	Dose tolerated	Dose curative.	Index
Mouse	1·200	0·045	1/26·5
Guineapig	0·100	0·010	1/10
Rabbit	0·600	0·030	1/20

Fouadin gm per kilo.

	Dose tolerated	Dose curative.	Index
Mouse	0·500	0·150	1/3·3
Guineapig	0·210	0·140	1/1·5
Rabbit	0·080	>0·080	>1/1

Bayer 205 gm. per kilo.

	Dose tolerated	Dose curative.	Index.
Mouse	0·600	0·0014	1/428·5
Guineapig	0·200	0·007	1/42·8
Rabbit	0·600	0·006	1/100

From these results the authors conclude that, even with the same infection, each drug exhibits a different curative value in the different host, and that for each host it exhibits a different toxicity. *W. Y.*

ROSKIN (G.) & ROMANOWA (K.). Experimentell-zytologische Untersuchungen ueber die Einwirkung einiger chemotherapeutischer Stoffe auf Trypanosomen. **[Experimental Cytological Investigations on the Action of Certain Chemotherapeutic Substances on Trypanosomes.]**—*Zent. f. Bakt.* I. Abt. Orig. 1933. July 11. Vol. 129. No. 1/2. pp. 35–40. [17 refs.]

In this paper the authors describe a new technique for recognizing the early action of various drugs on trypanosomes both *in vivo* and *in vitro*.

The method is based on the investigations of UNNA, who prepared the leukobase of methylene blue, which is designated " Rongalitweiss." Roskin in a former paper had put forward the view that the staining of certain parts of cells (normal and pathological) by " Rongalitweiss " was due to the presence of a certain ferment in the protoplasm ; this is destroyed by heating to 80°C. and by long exposure to alcohol, formalin or X-rays, and is much damaged by KCN ; and when this has occurred the cell no longer stains with " Rongalitweiss." HIRSCH and BUCHMANN reached similar conclusions and called the ferment " Oxydoredukase." In normal trypanosomes the " Rongalitweiss " reaction is very pronounced, *i.e.*, portions of their protoplasm take on a distinct blue colouration, but this never extends over the whole cell body. In most of the trypansomes the portion of the body near the flagellum stains most intensely, and in the nucleus the karyosome stains more or less distinctly.

The authors' experiments were conducted as follows :—Dry blood films were made of the blood of a mouse heavily infected with *T. equiperdum*. A drug (stovarsol, tartar emetic, germanin, neosalvarsan, old salvarsan or trypaflavin) was then administered and more blood films made at intervals between 10 mins. and 48 hours later. All the films were then treated by " Rongalitweiss " as follows :—the freshly prepared material was poured on the films and allowed to act for 2 mins., the films were then rinsed in oxygen-free water and embedded in paraffin oil.

In the first experiment in which 0·4 cc. of a 1 per cent. solution of stovarsol was given to the infected mouse, it was found that in the blood films made 10 mins. later the trypanosomes no longer stained with " Rongalitweiss." Similarly, the trypanosomes in the preparations made after 20 mins., 30 mins., 60 mins., and 120 mins. all failed to stain. Details are given of the results obtained with the other drugs.

From this work the authors conclude :—

1. That by means of the " Rongalitweiss " method they have demonstrated a ferment-like factor in the nucleus and cytoplasm of trypanosomes.
2. With the assistance of this method they were able to detect an effect of various drugs on trypanosomes very early at a time when other methods failed to reveal any change in the nucleus or cytoplasm.
3. The action of the drugs examined was directed against the ferment-like factor (the Oxydoredukase).
4. Stovarsol and salvarsan exerted the most intense action.
5. In the case of germanin the disturbance in function of the Oxydoredukase is probably a secondary phenomenon.

6. The "Rongalitweiss" method permitted both *in vivo* and *in vitro* a differentiation in the character of the action of the various chemotherapeutic substances.
7. It also makes it possible to observe the relative changes produced by the various drugs in the nucleus and cytoplasm of the trypanosomes.

W. Y.

HALPERIN (E. P.). Zur Frage der Chemoflexion. **[On Chemoflexion.]** —*Zent. f. Bakt.* I. Abt. Orig. 1933. May 22. Vol. 128. No. 5/6. pp. 320–326. With 4 figs.

Halperin has reinvestigated the phenomenon of chemoflexion described in 1911 by MORGENROTH and ROSENTHAL.

These authors injected mice of 15–20 gm. weight with trypanosomes (*T. brucei* Prowazek); when the peripheral blood contained between 50,000 and 300,000 trypanosomes per cc. the mice were treated with tartar emetic 0·2 cc. of a 1/1,000 solution subcutaneously. Within 70–180 minutes the parasites had disappeared completely from the blood. Counts were made every 10 minutes and the rate of disappearance of the parasites represented by a curve. Within a few days a relapse occurred, and when the number of parasites again reached between 50,000 and 300,000 per cc. a second dose of the same amount of tartar emetic was given and the rate of disappearance of the parasites again plotted on a chart. MORGENROTH and ROSENTHAL found in most cases that the curve representing the rate of disappearance of the parasites of the first relapse was greatly prolonged and that the parasites had sometimes not completely disappeared after 24 hours. In no case did the authors succeed in transmitting this enhanced resistance to a new animal. To this phenomenon MORGENROTH gave the name chemoflexion; it was considered by him to represent the first stage of the development of drug-resistance.

In order the throw further light on the matter, Halperin has repeated and extended MORGENROTH and ROSENTHAL'S observations: in addition to *T. brucei* (Prowazek) he used *T. brucei* (Paris), *T. equiperdum* and *T. rhodesiense*. His technique was essentially the same as MORGENROTH'S. The phenomenon was obtained with all the strains, but only when small doses (0·2 cc. of 1/1,000 solution) of the drug were employed. In contrast to MORGENROTH and ROSENTHAL chemoflexion was not, as a rule, seen by Halperin until the third or fourth relapse, but this varied considerably in the different animals. The increased resistance sometimes remained for several relapses and sometimes disappeared to reappear again. Subinoculation of the resistant parasites to a normal animal invariably caused the resistance to disappear. *W. Y.*

LAVIER (G.). Sur le polymorphisme réel de certains trypanosomes réputés monomorphes. **[Polymorphism of Certain Trypanosomes considered Monomorphic.]**—*Ann. Parasit. Humaine et Comparée.* 1933. July 1. Vol. 11. No. 4. pp. 280–286. With 3 figs. [11 refs.]

The author has examined carefully a very old strain of *T. brucei* from Zululand, which has been maintained for more than 30 years by passage through mice at MESNIL'S laboratory in Paris. Contrary to the generally accepted view, he found that this strain is not strictly monomorphic, since he encountered about 2 short forms without free flagellum among each 1,000 individuals examined. Prolonged passage through small laboratory animals has therefore not entirely destroyed the polymorphic character of the strain, but has reduced it to a marked degree.

It is recorded that BRUCE (1911) had drawn attention to the fact that *T. evansi* was not strictly monomorphic, and that BLACKLOCK and the reviewer (1913) had noted the same of two strains of *T. equiperdum*. Lavier has confirmed these observations as the result of his examination of strains of *T. evansi* isolated respectively from a case of surra in Mauritius in 1925, and from a horse in Morocco in 1926, and also of a strain of *T. equiperdum* isolated in Algiers in 1922. Lavier is consequently of opinion that HOARE and COUTELEN'S classification of the trypanosomes [see above] needs some slight modification. Section B should be grouped as follows :—

I. Polymorphic trypanosomes.

1. Forms without free flagellum, numerous ; transmitted cyclically by Glossina. *T. brucei* syn *T. pecaudi, T. suis, T. equi, T. togolense, T. ugandae, T. sómaliense* pro parte. *T. rhodesiense* and *T. gambiense* are considered as varieties adapted to man.

2. Forms without free flagellum, rare.

a. Transmission by direct contact.—*T. equiperdum.*

b. Transmission non-cyclical by various biting insects.—*T. evansi.*

W. Y.

YORKE (Warrington), MURGATROYD (Frederick) & HAWKING (Frank). **The Relation of Polymorphic Trypanosomes, developing in the Gut of Glossina, to the Peritrophic Membrane.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 347–354. With 2 plates.

The authors confirm the work of TAYLOR [*ante*, p. 105] and his predecessors on the relation of the developing trypanosomes to the peritrophic membrane in Glossina.

These observations were made during experiments on the transmission of a tryparsamide-resistant strain of *T. brucei* through *G. morsitans* and *G. palpalis* [*ante*, p. 448]. In flies dissected 1–4 days after an infective feed trypanosomes could be found in the midgut multiplying in the lumen inside the peritrophic membrane and sections showed that a few forms were present in the space outside the membrane, reached apparently by passage round its free edge. After the first feed, however, on a clean animal they were no longer found inside the membrane but in great numbers outside it, eventually passing forward and reaching the proventriculus ; here they pass through the fluid secretion of the annular pad, from which the membrane is formed, and so reach the lumen of the proventriculus and oesophagus. Sections of the wall of the midgut, proventriculus and salivary gland of such a fly are reproduced and described. *A. G. B.*

KOFOID (Charles A.) & DONAT (Fae). **South American Trypanosomiasis of the Human Type—Occurrence in Mammals in the United States.**—*California & Western Med.* 1933. Apr. Vol. 38. No. 4. pp. 245–249. With 5 figs.

This paper, which contains nothing new, gives a general account of South American trypanosomiasis. The article, which was inspired by the fact that Kofoid has discovered *T. cruzi* in a cone nose bug (*Triatoma protracta*), which is known to occur throughout a large portion of California, was written in order that physicians attending patients bitten by "kissing bugs" may be aware of the possibility of trypanosome infection and seek to differentiate between toxic results of the bite and an infection by trypanosomes. *W. Y.*

DE AZEVEDO (A. Penna). [In Portuguese and German.] Histologia pathologica da glandula thyreoide na fórma aguda da molestia de Chagas (Trypanosomose americana). Pathologische Histologie der Schildruese bei der akuten Form der Chagas-Krankheit (amerikanische Trypanosomiasis). [**Morbid Histology of the Thyroid Gland in Acute Chagas Disease.**]—*Mem. Inst. Oswaldo Cruz.* 1933. Vol. 27. No. 2. In Portuguese pp. 93–123. With 15 figs. on 14 plates. [44 refs.] In German pp. 124–138.

The author has made a study of the histological changes in the thyroid gland in 5 cases of acute Chagas disease in young children 4 to 20 months old. The subject is of importance, especially in view of the simultaneous occurrence of Chagas disease and endemic goitre in the same regions. A clinical account of each of the 5 cases is given, and this is followed by a detailed description of the histological appearances found in the thyroid gland in each patient.

All patients exhibited a diffuse hyperplasia of the thyroid, although the type varied from case to case. On the basis of Buerkle-de la Camp's classification the histological changes in the thyroid of each case can be described as follows :—Case 1♂, diffuse colloid microfollicular struma; Case 2♀, diffuse parenchymatous struma neonatorum; Case 3♀, intermediate form between 1 and 2; Cases 4♀ and 5♂ diffuse parenchymatous struma neonatorum. Thus, in three instances there was a typical picture of the diffuse parenchymatous goitre of the new-born, in one instance there was a diffuse microfollicular colloid goitre and in the other instance an intermediate form. All patients had shown trypanosomes in the blood, and leishmanial forms were found in the various organs, particularly in the heart muscle. In a single case parasites were even discovered in the epithelium of the thyroid. No inflammatory interstitial changes were seen in any of the cases. The author considers the diffuse parenchymatous goitre of the new-born to be the characteristic type seen in acute Chagas disease. The article is illustrated by 14 microphotographs. *W. Y.*

CHAGAS (Evandro). Novos estudos sobre a forma cardiaca da *Trypanosomiase americana.* [**Fresh Studies of the Cardiac Form of American Trypanosomiasis.**]—*Mem. Inst. Oswaldo Cruz.* 1932. Vol. 26. No. 3. pp. 329–338. With 7 coloured plates.

This article deals with the subject of cardiac arhythmia in Chagas's disease, to which reference has been repeatedly made in this *Bulletin* (Vol. 25, p. 789 ; Vol. 27, pp. 838 and 839 and Vol. 28, p. 377). Clinical details are given of four patients, and their electrocardiographic tracings.

In the first, a boy of 14 years, there was organic interference in auriculo-ventricular conduction with partial heart-block ; in the second, a man of 22 years, there were signs of a diffuse myocarditis with resulting derangement of function evidenced by intraventricular blocking and myocardial irritability. The third, a man 26 years of age, suffered with deeper myocardial lesions affecting conductivity of the whole cardiac musculature—intra-auricular, auriculo-ventricular, intraventricular block and extrasystoles. Lastly, a man of 49 years, showed signs of partial A V block, slight intraventricular and more definite intra-auricular block. The article, which is of greater interest to the cardiologist than the general practitioner, is illustrated by radiograms of the thorax and electrocardiograms depicting the conditions described in the text. *H. H. S.*

CAMPOS (Ernesto de Souza) & ARTIGAS (Paulo de Toledo). Alterações do pulmão na trypanosomiase americana experimental e contribuição para e estudo da natureza das cellulas phagocytarias do pulmão. [**Lung Changes in Experimental American Trypanosomiasis.**]—Reprinted from *Ann. Faculdade de Med. São Paulo.* 1932. Vol. 7. 23 pp. With 14 figs. (8 coloured) on 6 plates. [21 refs.] English summary.

A detailed study was made of the lungs of seven puppies infected with *T. cruzi*; these animals acquired the infection congenitally from two mothers which had suffered from a chronic infection of the disease since 1927 and 1928.

In the blood vessels the adult flagellate form of the parasite was found lying free between the cells, and in the alveoli loose cells were seen, some of which were loaded with parasites. These loose cells were in every respect similar to the dust cells. In a few alveoli a parietal cell was found to be parasitized. Similar parasitized cells were found in the inter-alveoli tissue and, as the result of proliferation of these cells, the septa were thickened. The authors reach the conclusion that parasitism of the lungs by *T. cruzi* represents a systematic reaction of the phagocytic cel's, and is essentially the result of a cellular defence mechanism against the invasion of the parasites.

W. Y.

ARANTES (J. B.). Do comportamento do *Trypanosoma cruzi* no *Silenus rhesus.* [**Behaviour of** *T. cruzi* **in** *S. rhesus.*]—*Mem. Inst. Butantan.* 1931. Vol. 6. pp. 233–235. With 2 plates (1 coloured). English summary (9 lines).

This note draws attention to the fact that *T. cruzi* is very pathogenic for *Silenus* (*Macacus*) *rhesus.* Six of these monkeys, one of which was inoculated with the faeces of an infected *Triatoma infestans,* two with the blood of an infected guineapig, and three with the blood of an infected Silenus, all became infected and died of the disease.

W. Y.

DIAS (Emmanuel). Immunité naturelle des animaux à sang froid vis-à-vis de l'infection par le *Trypanosoma cruzi.* [**Natural Immunity of Cold-Blooded Animals to** *T. cruzi* **Infection.**]—*C. R. Soc. Biol.* 1933. Apr. 27. Vol. 112. No. 14. pp. 1474–1475.

After briefly discussing previous literature dealing with this subject, the author decribes his own experiments which consisted in inoculating the blood of a guineapig infected with *T. cruzi* into reptiles (*Tropidurus torquatus* and *Ameiva surinamensis*) and batrachians (*Leptodactylus ocellatus*); and also the blood of an infected dog into *Bufo crucifer.* The result was always negative, and study of the peritoneal fluid of reptiles inoculated by this route showed that the parasites disappeared from lysis and phagocytosis in less than 4 hours.

W. Y.

Dias (Emmanuel). [In Portuguese & English.] Sobre um Schizotrypanum de um morcego do Brasil. (Nota preliminar.) **[On a Schizotrypanum from a Bat of Brazil.]**—*Mem. Inst. Oswaldo Cruz.* 1933. Vol. 27. No. 2. In Portuguese pp. 139–142. With 3 figs. on 2 plates. In English pp. 143–146.

The blood of a number of mammalia at Lassance (Minas Geraes) was examined for trypanosmes and 2 dogs, 4 armadillos and 5 bats were found to be infected. The parasite from the dogs and armadillos was identified as *T. cruzi* by means of inoculation and histological examinations

Of 22 bats (*Phyllostomidae*) examined only 5 were found to be infected , the abode of almost all of them was the ceiling of the house inhabited by the author. Morphologically, the parasites of the bat closely resembled *T. cruzi*, but subinoculation made into two guinea-pigs failed. Histological examinations were made of the tissues of three of the infected bats. In two of them no multiplication forms were found in the tissues, but in one (the blood of which was heavily infected) the author found in sections of the lung and small intestine two cells with numerous leishmaniform parasites.

The author believes that the parasite he has found in bats is a non-pathogenic parasite, possibly *T. vespertilionis*, and he remarks that the possible co-existence in bats of two trypanosomes so closely related as *T cruzi* and *T vespertilionis* must be borne in mind *W Y.*

Vaucel Les acquisitions nouvelles dans l'étude des trypanosomiases **[Recent Knowledge of Trypanosomiasis.]**—*Ann de Méd et de Pharm Colon* 1933 Jan -Feb -Mar Vol 31 No 1 pp. 25-63

This is a summary of recent work on trypanosomiasis It contains nothing new (except the spelling of the reviewer's name, which passes through such forms as Burke, Yorbe, and Yorje) *W Y*

Ashley (J. N) Browning (C H), Cohen (J B) & Gulbransen (R) **The Antiseptic and Trypanocidal Properties of Some Anil and Styryl Derivatives of 4 Amino Quinaldine.**—*Proc Roy Soc* Ser B 1933 Aug 1 Vol 113 No B783 pp 293–299

Browning (C H), Cohen (J B), Cooper (K E), Ellingworth (S) & Gulbransen (R) **The Antiseptic and Trypanocidal Action of Some Benzoylamino Quinoline Anil and Styryl Compounds.**—*Ibid* pp 300–307

These papers are of a chemical and technical nature and should be consulted in the original by those interested *W Y*

Lloyd (Ll) **Factors influencing Trypanosome Infection Rate in Tsetse Flies.** [Correspondence]—*Trans Roy Soc Trop Med & Hyg* 1933 May 5 Vol 26 No 6 pp 555–556

In this letter Lloyd continues the discussion between Duke and himself [*ante*, p 453] on the subject of the influence of temperature on the infection rate of Glossina No further notice seems necessary *W Y.*

MISCELLANEOUS.

LAMBERT (Sylvester M.). **Some Polynesian Medical Superstitions encountered in the Cook Islands.**—*Jl. Trop. Med. & Hyg.* 1933. July 1. Vol. 36. No. 13. pp. 189–192.

In the Cook Islands, writes Dr. Lambert, one of the chief obstacles to dealing with the medical needs of the native population has been lack of knowledge on the part of the medical staff of the customs and medical lore of the people.

These natives, though they are the most intelligent and most modern of the South Sea Islanders, have a deep rooted belief in magic and witch doctors. The native beliefs retailed here chiefly concern leprosy and elephantiasis, diseases specially repugnant to a people of great physical perfection These diseases are either the punishment of an avenging god for the breaking of a tabu or may be willed upon a member of the community by a sufferer. Instances are given. Lambert writes that it will be long before the Cook Islands native will believe that there is any relationship between elephantiasis and filariasis or that either is in any way connected with the bite of a mosquito. In one instance a father with elephantiasis willed the disease upon a worthless son , in another upon a daughter who offended both by taunting her father with his deformity and " running around with the boys " ; in a third a man who was hated by the husbands for his conquests of their wives was made drunk, and the urine of a sufferer was mixed with his beer. Every time elephantiasis resulted.

There has been a small Medical Department in the Cook Islands for 40 years , native medical practitioners trained at Suva are now to be established in each island of the group. *A. G B.*

JACOCKS (W P.). **Ceylon Health Units.**—*Indian Med. Gaz* 1933. June. Vol. 68. No. 6. pp. 332–338.

A full account of the Ceylon Health Units, their organization and their work.

In the words of the author :—

> " The object is to bring to rural areas the benefits of health protection which are now enjoyed by large towns and cities. This end is accomplished by dividing rural areas into suitable districts and introducing therein small but completely trained bodies of workers who remain permanently in the delimited area and undertake all public health problems Their activities embrace health education, general sanitation, collection, tabulation and study of vital and morbidity statistics, control of preventable endemic and epidemic diseases, vaccination and preventive inoculation, maternity and infant welfare work, school health work, and adult hygiene."

Health unit work was commenced in Ceylon in 1926. In December 1932 eight units were in operation in an area of 856 square miles containing 440,000 people. A long extract is given from the 1921 Report of the Department of Medical and Sanitary Services [see Supplement, 1932, pp. 80–81] describing the activities of the unit. Medical officers of health, public health nurses, midwives and sanitary inspectors now attempt no field work till they have spent a period at specified tasks in the health unit organization. The first unit, Kalutara Totamune, is used by the department as a training station. In the selection of this first area essential points were that the leading people should earnestly desire the work and that early co-operation of officials should be secured. The author writes :—

> " It is probably unwise to attempt to interest villagers in serious health work in those sections where there is not a fair degree of prosperity. If a villager has to struggle for his daily bread, and to be content with scanty and mean clothes and primitive shelter, it is not reasonable to expect him to listen to health propaganda of any sort. After his poverty is somewhat reduced, his food and clothing reasonably assured, his fields productive and his house respectable, he will have time and inclination to consider other matters. Consequently remote or backward districts should first receive other fundamental attention."

Experience indicates that a population of about 80,000 can be successfully handled. A statement of expenditure is appended. [For details of this and the work done the paper must be consulted.]

A. G. B.

SOUTHERN RHODESIA. **Report on the Public Health for the Year 1932** [ASKINS (R. A.), Medical Director].—31 pp. 1933. Salisbury: Govt. Printer.

In his introductory remarks Dr. Askins says that the health of the colony can be stated to be definitely good and to compare well with that of other British territories ; special consideration has been given to the combating of malaria—the major health problem—the treatment of mental disease and to measures against leprosy among the native population.

Vital Statistics.—These concern the Europeans only ; no figures are given for natives, who numbered 1,055,000 (estimated) at the 1931 Census. The estimated European population was 51,150 ; the rate of natural increase was 13·3 per mille (15·26 in 1931). There were 1,166 births, a birth-rate of 22·8 (23·58) per mille, slightly lower than the Union of S. Africa. There were 485 deaths, or 9·48 (8·32) per mille ; here the rate is slightly higher than that of the Union.

A table gives the causes of European deaths in 1928–32 ; the first five entries are, in descending order, pneumonia and bronchitis, violence, cancer, heart diseases, malaria and blackwater ; tuberculosis comes eighth. There were 64 deaths of infants under 12 months, a rate of 55 (45) per mille, 8 per 1,000 below the previous 5-year average, and a lower rate than that of the Union or of England and Wales. The causes of death are analysed. A table shows that in the 10-year period, 1923–32, nearly half the deaths occurred in the first month, from causes operating before birth. Other causes are diarrhoea and malaria, pointing to the need for antenatal supervision of the mothers, more care of the babies' food and protection from malaria. Child Welfare societies do valuable work, but the M.O.H. of Salisbury regrets that his department has no control over the activities of health visitors.

There were 7 deaths of European mothers due to pregnancy and childbirth, a rate of 6 per 1,000 live births. Of the causes during the 5-year period puerperal sepsis was much the largest factor, followed by accidents of pregnancy and childbirth. The author emphasizes again the need for antenatal supervision, for the provision of hospital beds for confinements and for trained midwives ; the latter are essential in a colony where many mothers live long distances from medical help and female assistance in the home is often lacking. Fortunately S.

Rhodesia possesses a number of maternity homes provided with the aid of the Beit trustees. S. Rhodesia possesses excellent facilities for training general nurses but none for training midwives ; to obtain the necessary qualification it is necessary to leave the Colony, with the result that most of the midwives are untrained. During the year the Government made annual grants amounting to £1,762 towards the maintenance of maternity homes.

Infectious and Communicable Diseases.—A table shows those notified in 1932. It is headed, as regards Europeans, by chicken-pox, measles, whooping-cough, diphtheria.

Malaria.—There were 25 European deaths and 12 from blackwater, a total of 37 which is about the average of recent years. Malaria accounts for 8 per cent. of European deaths, including in 1932, 8 young babies ; " it constitutes what is perhaps the gravest health problem of the colony." Dr. Askins discusses this problem and suggests that the study of the mosquito-vectors may lead to its solution as it appears to have done in the Union. The Government has arranged for an expert medical entomologist to study the problem during 1933. He discusses also the chemotherapy of malaria. Government expenditure on quinine in 1932 was £2,152, and receipts from sales £1,835.

Leprosy.—The incidence of leprosy among natives has been found to be greater than was realized. About 1,000 cases were treated in 1932, mainly in two institutions. Grants have been given by the British Empire Leprosy Relief Association. The policy adopted is : voluntary measures as far as possible but the Leprosy Repression Laws are retained and compulsion is exercised when necessary.

Plague.—So far plague is unknown but it has reached the northern part of South-west Africa and crossed into Angola [see this *Bulletin*, *ante*, p. 565] and is therefore very likely to enter S. Rhodesia from the south. Careful watch is being kept for it both in rodents and man. A list is given of veld rodents which have been identified as carriers.

Helminthiasis.—Intestinal bilharziasis was found in 3·5 per cent. of 372 Europeans, and in 16·4 per cent. of 665 natives. Urinary bilharziasis was found in 8·8 per cent. of 781 Europeans and 30·9 per cent. of 893 natives. Hookworm infection was recognized in 14·3 of natives admitted to Salisbury Hospital during the year.

Other diseases mentioned are *yaws*, of wide occurrence in the lower part of the Colony ; *undulant fever*, two European cases ; *trypanosomiasis*, one case in a native from Portuguese East Africa ; 40 native cases of *smallpox*. *Pseudo-typhus* or tick typhus is becoming more common and can probably be contracted in any part of the country. No death has so far been recorded. *Venereal disease* cannot at present be effectively combated. Of *tuberculosis* among Europeans there were 17 deaths. Its incidence on the natives is unknown.

Of *diphtheria* 52 European cases were notified with 6 deaths among young children. Anatoxin is kept available at the Public Health Laboratory, Salisbury, and is issued at cost price. The parents were circularized about the known facts of immunization, the Press gave support, with the result that large numbers of babies and school children are now being immunized. Of *typhoid* there were 37 cases in Europeans, and of *cerebrospinal meningitis* 2 cases. Of *whooping cough* and *measles* there were 410 and 293 cases, with 17 and 3 deaths. " Whooping cough is a grave disease in S. Rhodesia " *Influenza* was epidemic and caused 17 European deaths.[*] There were no cases of typhus fever or rabies.

General.—With reference to *mental diseases* a brief account is given of the Mental Treatment Act, 1930, and it is stated that a medical officer is to be appointed to the Ingutsheni Mental Hospital with first class experience of the treatment of the insane. As an outcome of the Conference convened by the League of Nations which met in Capetown [see this *Bulletin, ante,* p. 563] S. Rhodesia will adopt the Draft Convention for the *Sanitary Control of Aircraft.* Probably Salisbury Aerodrome will be declared a Sanitary Aerodrome and surveillance of passengers who have left an infected area within 6 days will be enforced. An area on the northern border of the Colony is being surveyed, in collaboration with the Health Division of the Rockefeller Foundation, to prove the absence of yellow fever.

Town planning is another subject discussed. Suburbs are springing up at the edge of the large towns without any co-ordination or regard for future development ; no land is being reserved. S. Rhodesia at present possesses no town planning legislation in the modern sense. A Bill has been prepared and is under discussion by various bodies to place in the hands of local authorities power of effecting town planning both within and without their borders.

A section on the health of the B.S.A. police is followed by one on the School Medical Service. A whole-time experienced doctor visits the girls' schools and schools in outlying areas while the rest are visited by Government Medical Officers. Each child undergoes four routine examinations in its school career. In 1932, 4,415 children were examined and the results are tabulated. The author draws attention to malnutrition which was evident in entrants and probably the result of the financial depression and to splenic enlargement noted in 62 children and practically all due to malaria. Bilharzia was noted in 25 [but it is not stated whether all were examined for the eggs of this parasite or only those who presented symptoms]. Generally, the health of the children was considered satisfactory. 1,640 underwent a dental examination. The Government Dentists, who have hitherto confined their attention to the school children, are now to look after the teeth of the police as well as do essential work for paupers and prisoners ; every member of the Police Force is to be examined once a year.

Under the heading, *Health of the Native,* it is stated that the greater portion of the native population is devoid of any means of medical treatment. A system of outlying dispensaries in charge of native orderlies under the supervision of European doctors is to be introduced and is already at work on a small scale with encouraging results. [It is not stated what training the native orderlies receive.] From the results of research into tuberculosis among natives applying for work at the S. African mines, where it is found that 72 per cent. have acquired infection before arrival, investigation is to be made on S. Rhodesian natives in two areas where government has established a scheme for treatment.

Native labour on mines and works.—The average number employed on mines was 36,068 ; there was a greatly diminished number of deaths from sickness, including a 22 per cent. drop in the mortality from pneumonia. An officer of the Native Department is attached to Dr. Askins' staff as Inspector of Compounds, with great advantage both to mine owners and employees. The Inspector sees that the minimum ration as laid down by law is issued, and sees to housing, latrine accommodation, prompt payment of wages, etc. A table of cases of sickness and deaths shows that after minor ailments and accidents and influenza the chief cause of sickness was malaria, and the chief cause of death pneumonia. The death rate from disease per mille per annum has fallen from 17 and 18 in 1928 and 1929 to 9·5 in 1932.

Dr. W. K. BLACKIE reports on the Public Health Laboratory and Pasteur Institute, Salisbury, where 13,305 examinations were carried out. Among a number of details the following are of interest. 338 throat swabs were examined and cultured for the diphtheria bacillus and a positive cultural result was obtained in 55 instances. In 665 stool examinations (natives) *Schistosoma mansoni* was met with 102 times and *S. haematobium* 7 times; hookworm 95; *Ternidens deminutus* 12 [see this *Bulletin*, Vol. 29, pp. 69 and 403]. Of 170 positive bloods for malaria *P. falciparum* was found every time but two. It is noted that in assessing degrees of anaemia at 4,500 feet an average red count of 5,500,000 must be allowed for adult males and 5,200,000 for adult females. A transfusion service of 70 persons has been instituted and 31 blood transfusions, chiefly for blackwater, were carried out.

[This is a well arranged and clearly written report which will be read with equal interest by laymen and the profession. Subject to the financial bar Dr. Askins should have little difficulty in effecting the improvements he desires. Little seems to be known of the state of health of the million natives.] *A. G. B.*

LINDSAY (Kenneth). **Notes on Medical Practice on the Brasileno-Paraguayan Frontier.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 547–554.

The author draws on his own experience and, during a period of more than 30 years, that of his father, who, it is stated, has noticed the general health of the people slowly decline. He describes the land and its people, social conditions, the diseases met with and veterinary work. Rheumatic fever is said to have made its first appearance in 1929, and chorea about the same time. Leishmaniasis is described but without fresh information. Some practical hints are given of the treatment of the myiases. The contribution is of interest but not adapted to summary. *A. G. B.*

CULPIN (Millais). **An Examination of Tropical Neurasthenia.**—*Proc. Roy. Soc. Med.* 1933. May. Vol. 26. No. 7. pp. 911–917 (Sect. Trop. Dis. & Parasit. pp. 47–53). [17 refs.]

Originally when the term neurasthenia was popularized by BEARD in the eighteen sixties, it was regarded as a disturbance in the balance between nerve waste and nerve repair—a physical condition due to a physiological upset. From among the several conditions covered by the term FREUD thirty years later separated what he called anxiety neurosis and anxiety hysteria, better described as anxiety states, and RAYMOND and JANET the obsessional states. Anxiety and obsessional states together with hysteria are now considered upon a psychological basis and grouped as psychoneuroses. It is questionable whether any small group of cases still remains which might still be called neurasthenia, cases characterized by marked chronic physical and mental lassitude, and to be distinguished from another group which paraded under the guide of neurasthenia until distinguished by Farquhar BUZZARD as akin to manic depression and called by him autonomous depression. Minor psychoneuroses are very common in this country—50 per cent. of a working population of 1,500 persons were found to be affected, but in no case was a diagnosis of neurasthenia made.

Turning now to the condition as it has been represented in tropical countries, some idea of the fundamental different conceptions of neurasthenia may be gained from the correspondence in the *British Medical Journal* in 1926. So called tropical neurasthenia may be very common in many warm countries but the author's own experience goes to show that a population may exist in a tropical country such as Northern Queensland without neurasthenia being anything but rarely seen. The causes of " tropical " neurasthenia are the same as those met with in temperate climes. Tropical neurasthenia affects those persons who would tend to break down wherever they were. The general picture of cases of neurasthenia seen in England from the tropics presents no difference from that seen in other groups—war neurasthenia, miners' nystagmus, telegraphists' cramp, traumatic neurasthenia. The tropical cases should be grouped as " minor psychoneuroses occurring in the tropics," and the term " tropical neurasthenia " should disappear.

These conditions are failures of adaptation dependent on predisposition. The stimulus needed to produce breakdown is in inverse proportion to predisposition and may consist in any of the difficulties or demands of life but never hard work. Some of the difficulties of emotional adjustment to harmful stimuli may be peculiar to the tropics, others are dependent rather upon the attitude to life than upon climate.

Prophylaxis lies in the psychological examination of the candidate for residence in the tropics. Such a method of examination may be learned and it will serve to detect all those with predisposition. This has been effectively demonstrated in the selection of candidates for the staff of the Anglo-Persian Oil Company. Not only is it essential that the medical officer making such selection should have the requisite knowledge but also the medical staff abroad should be trained to pay attention to matters psychological in dealing with sick persons.

H. S. Stannus.

CILENTO (R. W.). **The Anne MacKenzie Oration : The Conquest of Climate.**—*Med. Jl. Australia.* 1933. Apr. 8. 20th Year. Vol. 1. No. 14. pp. 421–432.

An interesting and thought-provoking address delivered to a lay audience at Canberra. *A. G. B.*

MCMULLEN. Observations et expériences nouvelles sur le transport des moustiques par les aéroplanes. [**Fresh Experiments on the Transport of Mosquitoes by Aeroplanes.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 1024–1027.

In these experiments, marked *Aedes aegypti* were released in passenger planes leaving San Salvador for Brownsville, Texas, and Cristobal (Canal Zone) for the same destination, and from Cristobal to Miami (Florida). In one series a total of 840 mosquitoes were released on 12 planes and about 8 per cent. reached the destination. In one instance 27 out of 80 did so, the voyage having lasted over 30 hours ; 26 of them were females and 20 were gorged with blood. Other similar data are given. In one case the mosquitoes were so importunate that the waiter was obliged to use an insecticidal spray. The author thinks this was used in other instances also, for it was after a second warning had been given to desist from the use of the spray during the experiments that the biggest catch was made (21 out of 60). The longest persistence was over 79 hours, after ten landings, three of which were for the night. Mosquitoes of over 12 days of age, which had imbibed blood, survived the flights at least as well as those just emerged. It is believed that insecticidal sprays carefully carried out will completely clear aeroplanes of mosquitoes. *A. G. B.*

TOUMANOFF (C.). Sur un premier essai d'acclimatation au Tonkin de *Girardinus guppyi*. Remarques sur le facteur thermique de l'activité larvicide de ce poisson. [**Acclimatization of *G. guppyi* at Tonking.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 632–638.

The author conveyed ten specimens of *Girardinus guppyi*, a viviparous S. American fish, from the Pasteur Institute, Paris, to Tonking. Two months later four females survived. From these in 18 months 708 fish were obtained in the laboratory and in the open air in 12 months 47 multiplied to 520. Trials of their voracity showed that this was four times as great at 27°–30° as at 16°–20°C., an observation which the author thinks has a practical bearing. It remains to be seen whether they would survive the attacks of larger carnivorous fish.

A. G. B.

FROES (Heitor P.). **Studies on Venomous Fishes of Tropical Countries. (On the Brazilian Species of the Genus *Thalassophryne*, Guenther.)** —*Jl. Trop. Med. & Hyg.* 1933. May 1. Vol. 36. No. 9. pp. 134–135. With 2 figs.

The author observes that the text-book accounts of vulnerant fishes of the genus *Thalassophryne* are incomplete or incorrect. There are six species, 4 of which are found in Brazil. Some experiments on a guineapig and a fowl are described, from which it is concluded that the action of the venom is general as well as local, acting on the nervous system. There was no haemolysis. *Thalassophryne punctata* is figured showing the two dorsal and one of the pectoral barbs. *A. G. B.*

ANDREWS (Mary N.). **The Incidence of Intestinal Parasites in the Wuhan Area.**—*Chinese Med. Jl.* 1933. Apr. Vol. 47. No. 4. pp. 390–396.

In October–December 1931 the Henry Lester Institute, Shanghai, maintained a laboratory in Hankow in connexion with hospitals for flood refugees. Patients from the refugee camps formed the material of this enquiry.

The routine followed was the examination of two fairly thick films of faeces in saline under a low power for detection of ova and for protozoa a thin emulsion in saline examined under the high power; in certain cases an iodine film was also examined. The examinations concerned 632 patients and numbered 913; 508 or 80 per cent. showed parasites, 9·6 per cent. harbouring protozoa only, 54 per cent. helminths only, and 16 per cent. both types of parasite. The findings are tabulated, and compared with FAUST and WASSELL's survey of the adjoining city of Wuchang in 1921 [see this *Bulletin*, Vol. 19, p. 458].

Parasite		Hankow 1931	Wuchang 1921
Number of cases examined		632	359
Per cent. positive		80·3	76·8
	Cases	Per cent.	Per cent.
Entamoeba histolytica			
Free forms	34		
Cysts	63		
Total	97	15·0	2·5
Entamoeba coli			
Free forms	3		
Cysts	39		
Total	42	6·6	5·0
Giardia lamblia			
Free forms	2		
Cysts	16		
Total	18	2·8	3·0
Trichomonas hominis			
Total	61	9·4	0·6
Chilomastix mesnili			
Free forms	4		
Cysts	4		
Total	8	1·2	—
Balantidium coli	1	0·15	0·3
Endolimax nana			
Cysts	4	0·6	—
Iodamoeba butschlii			
Cysts	2	0·3	—
Tricercomonas			
Cysts	2	0·3	—
Ascaris ova	352	55·6	54·3
Hookworm ova	177	27·0	22·0
Trichuria ova	199	30·0	36·2
Trichostrongylus ova	3	0·4	—
Oxyuris ova	1	0·16	—
Strongyloides larva	3	0·4	0·3
Fasciolopsis buski ova	32	5·0	0·6
Clonorchis sinensis ova	50	8·0	—
Schistosoma japonicum ova	32	5·0	3·6
Taenia ova	1	0·15	—
Hymenolepis ova	1	0·15	—

The cases of *Fasciolopsis buski* infestation were traced to Hanchuan, a small town on the Han river, which would seem to be an unrecorded focus of infection. *Clonorchis sinensis* is not mentioned in the Wuchang report. It is acquired from eating raw fish, which the refugees are very likely to have done. Of the 32 cases of schistosome infection in only 5 did the stools contain blood and mucus and in three of these there were also free forms of *E. histolytica*. The *E. histolytica* records are much larger in this than in the Wuchang series. The relation of intestinal flagellates to diarrhoea is discussed : there seems to have been little evidence of flagellate pathogenicity in these records.

A. G. B.

VENERONI (Carlo). Distribuzione dei parassiti intestinali nel bassopiano Yemenita. [**Intestinal Parasites in Yemen Lowlanders.**]—*Arch. Ital. Sci. Med. Colon.* 1933. July 1. Vol. 14. No. 7. pp. 398–400. English summary (5 lines).

Intestinal parasites are very common in the Yemen Lowlands. Positive findings were noted in 565 out of 700 specimens of faeces, 80 per cent. The protozoon most frequently encountered was *E. histolytica* in 102 (14·5 per cent.) and of helminthic infestations Ascaris in 120 (17 per cent.), *Sch. haematobium* [so stated in a table and said in the text to be the only species] in 65 (9·2 per cent.), *Taenia saginata* (5·5), *Ancylostoma duodenale* (3·7). Other parasites mentioned are Dracunculus in 10 per cent. and *W. bancrofti* and *F. hepatica* as " somewhat rare." The reasons given for the high incidence of these infestations are : The insanitary condition of the people, the scarcity of rain in general, but occasional flooding from the hills leaving small ponds in which men and animals bathe [this would hardly be a satisfactory explanation of the parasitism]. *H. H. S.*

COULTER (J. L. S.). **The Land-Leech in Ceylon.**—*Jl. Roy. Nav. Med. Serv.* 1933. Apr. Vol. 19. No. 2. pp. 105–108.

The Royal Naval Camp, Diyatalawa, Ceylon, is situated about 120 miles up country from Colombo at an altitude of 4,000 feet. On arrival here the ship's company of H.M.S. Enterprise was attacked by leeches (*Haemadipsa zeylanica*) with which in places the ground was thick. They progressed with astonishing speed. They covered the boots and penetrated everywhere including the boot eye-holes. The only efficient prophylaxis is tobacco. The presence of moistened tobacco in the region of the ankles prevents biting, and enables the wearer to walk with comfort where leeches abound. For removal of attached leeches the application of salt and water is advised. Some natives seem to be immune to leech bites when others are attacked.

A. G. B.

SERGENT (Edm.). L'Institut Pasteur du Maroc à Casablanca. [**The Moroccan Pasteur Institute at Casablanca.**]—*Ann. Inst. Pasteur.* 1933. July. Vol. 51. No. 1. pp. 5–13. With 9 figs.

A history and description of the Pasteur Institute established at Casablanca, with photographs and plans. It began to function on January 1, 1932, with Dr. G. BLANC as Director. Like other Instituts Pasteur it is under the direction, scientific, technical and administrative, of the parent Institution at Paris. Nothing is said of the source of its funds. *A. G. B.*

STRACHAN (P. D.). **The Dressing of Granulating Wounds and Ulcers.**—*South African Med. Jl.* 1933. June 24. Vol. 7. No. 12. pp. 397–398.

The author writes, from the Botsabelo Leper Asylum—

" After removing all dead tissue and rendering the ulcer free from virulent pyogenic infection by the application of wet Dakin's solution compresses, or, in some cases, methyl violet, we cover the ulcer and a margin of healthy skin with a strip of elastoplast. This is left on for from two to four weeks. Any discharges that ooze through the plaster are wiped off, and the surface is dusted with boric acid powder, which forms a dry, odourless crust . . . the bandage should be applied, as directed, from the bases of the toes to above the site of the ulcer. . . . Under this treatment, we find that large ulcers of the legs, which could not be induced to heal under daily dressings, become covered with epithelialized scar tissue in a few weeks."

The advantages of the treatment were rapid healing and saving of time and dressing material. The author surmises that any durable undisturbed dressing would equal elastoplast and has begun to put this to the test. *A. G. B.*

ROBINSON (J. S.). **Treatment of the more Severe Cases of Simple Tropical Ulcer.**—*West African Med. Jl.* 1933. Apr. Vol. 6. No. 4. pp. 67–68.

A practical paper. The treatment of severe tropical ulcer is described, the scraping and cleansing under chloroform, the dressing, splinting, and grafting in full detail. The average stay of 62 cases was 28·4 days. *A. G. B.*

NORONHA (A. J.). **A Preliminary Note on the Prevalence of Rhinosporidiosis among Sand-Workers in Poona, with a Brief Description of Some Histological Features of the Rhinosporidial Polypus.**—*Jl. Trop. Med. & Hyg.* 1933. Apr. 15. Vol. 36. No. 8. pp. 115–120. With 13 figs.

The interest of this communication lies in its suggestion of a water-borne causation for rhinosporidiosis and its characterization as an industrial disease of occupation. Rhinosporidiosis, not at all a common disease, has been found to be so comparatively frequent among sand-workers in Poona as to make out a good case for association there of the occupation and the disease. The workers are divers who enter the river to collect sand, and the contention of the author is that the nasal mucosa is infected by contact with the water. Rhinosporidial polypi may occur not only in the nose and eye but also in the ear and as papillomata of uvula and penis. The polypus when removed is greyish white, has an appearance rather like coral and shows characteristic " shiny white spots representing the mature sporangium of the parasite." The histology of these polypi is now well-known since the publication of ASHWORTH's monograph. *W. F. Harvey.*

HASLÉ (G.). Traitement des splénomégalies tropicales par la solution de citrate de Normet. [**Treatment of Tropical Splenomegaly by Normet's Citrate Solution.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 843–849. With 2 figs.

Since 1930 the author has treated 132 cases of splenomegaly at Hué, Annam, with Normet's citrate solution, with much success. The solution has now the formula :—

Citrate of soda	gm.	22·0
,, lime	,,	6·5
,, magnesia	,,	4·5
,, iron and ammonia... ...	,,	1·0
,, manganese	,,	0·005
Distilled water Q.S.	cc.	1,000

The spleen in this disease may occupy the greater part of the abdomen or only pass the costal margin by a few centimetres. It is sometimes very hard, in other cases soft but resistant. It is usually moveable and may be prolapsed. An enlarged liver is found in 10 per cent. often accompanied by slight jaundice, sometimes by ascites and oedema of the legs. Anaemia is often extreme. The red cell count is about 3 millions, but may be as low as one million ; the haemoglobin figure averages 50.

The author thinks that this disease has close relations with malaria from which most of the patients have suffered. Splenic puncture practised in 55 cases has not shown parasites ; the author has found either plasmocytes with a rounded and excentric nucleus with basophil protoplasm, or polycaryocytes with 2 or 4 nuclei of the same structure as the plasmocytes. Normoblasts are found in the blood ; in only 7 patients have malarial parasites been detected there.

The citrate solution causes a striking change in the spleen both in its structure and volume. NORMET and TARDIEU believe that the plasmocytes, fixed cells, are transformed into polynuclears, mobile cells, ready to pass into the blood.

In the Annamite intravenous injections of the citrate are well tolerated in the daily dose of 15 cc. ; in the European there may be a violent reaction, which can be avoided by gradually increasing the dose. The author begins with two subcutaneous injections of 10 and 15 cc. on successive days, and from the 3rd to the 12th day part of the dose is subcutaneous and part intravenous. Three or four series of 12 injections may be given, at intervals of 10–15 days. Many details are given.

Of the patients treated 42 regained a normal spleen, 35 were much improved, 37 were improved, 18 were not benefited.

The author reckons that in 58 per cent. success was complete. The average duration of treatment was 4 months. In the two photographs the areas of the spleen before and after treatment are strikingly indicated. No relapses have so far been met with.

Brief notes are given of four cases. *A. G. B.*

i. HUARD (P.). Remarques sur la pathogénie, les aspects cliniques et l'évolution des myosites et pseudomyosites exotiques à staphylocoques. [**Pathogeny, Clinical Aspects and Evolution of Myositis and Pseudo-Myositis due to Staphylococci.**]—*Bull. Soc. Path. Exot.* 1933. May 10. Vol. 26. No. 5. pp. 693–697.

ii. ——. Myosite et pseudo-myosite aiguës à staphylocoques chez le même sujet.—*Ibid.* pp. 698–702.

i. This account is based on 23 published observations. Discussing the relation between these affections and filariasis the author reaches the conclusion that such a relation has not yet been demonstrated. He distinguishes four forms of staphylococcal myositis, (1) very acute and rapidly fatal, (2) acute, (3) sub-acute. He includes apparently in this last group the suppurating muscular haematomas, very frequent in the African negro, which contain chocolate pus or a red blood-like fluid. This form is not purely tropical, a case having been reported from France. (4) A myositis of "cold" evolution. BOUFFARD in discussion referred to cases in French West Africa in which a pasteurella was the infective agent [this *Bulletin*, Vol. 17, p. 242].

ii. The case of a Senegalese soldier landed at Marseilles is described with comments. Here there was a deep abscess in the left thigh, intermuscular, and another in the right quadriceps, strictly muscular; it is the former lesion to which the name pseudomyositis is given.

Diagnosis is made by blood culture, presence of glycaemia, and search for staphylococcus in the urine; a positive blood culture is of serious prognosis. For treatment insulin is useful when there is glycaemia; serum and vaccines are of not much value; the main treatment is surgical. [For recent literature of tropical myositis see this *Bulletin*, Vol. 28, pp. 46–49; 857]. *A. G. B.*

i. MILLER (Sinclair). **Protein Shock Therapy in Undulant Fever.**—*Lancet.* 1933. June 3. pp. 1177–1178.
ii. MANSON-BAHR (Philip). **Undulant Fever of the Abortus Type treated by Protein Shock.**—*Ibid.* pp. 1178–1179. With 1 chart.

i. In seven cases of undulant (abortus) fever T.A.B. treatment brought the disease to an end, in three with dramatic suddenness.

The author gives an account of the symptoms and course of the disease. He accepts a positive agglutination against *Br. abortus* of 1/80 or over as definite evidence of infection. His plan is to give a T.A.B. injection intravenously and to repeat it every 3 to 5 days. The summary of his cases shows that the disease had been in progress six months, 10 days, six weeks, more than 3 months, 3 weeks, 3 months and 2½ months, and that the titre of agglutination was 1/250, 1/5,000 (*melitensis*), 1/1,250, high, 1/320, 1/2,560, 1/1,250; in most instances there was agglutination to *melitensis* at a lower titre. There is no record of the isolation of *Br. abortus*.

ii. A very acute case of undulant fever of abortus type in which the organism was isolated from the blood and the fever was cut short abruptly after a month's duration by an injection of 50 million T.A.B. The serum reactions were investigated by Professor G. S. WILSON, who obtained a titre of 1/10,000 against *Br. abortus.* Recovery was uninterrupted. *A. G. B.*

BRUMMELKAMP (R.). Maagulcus en vegetatief zenuwstelsel bij den Javaan. [**Gastric Ulcer and the Vegetative Nervous System.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. June 20. Vol. 73. No. 13. pp. 770–796. With 4 graphs. [18 refs.]

A marked difference in the incidence of gastric ulcer is apparent between Javans (1 per cent.) and Chinese (10·1 per cent.). If then gastric ulcer develops on the basis of a disturbed sympathetic nervous system (BERGMANN), Javans should show a high degree of stability of this system. In addition KOUWENAAR holds that there is a shift of the orthosympathetic-parasympathetic equilibrium to the vagus side, that is to say a relative preponderance of parasympathetic activity. The author in his investigation of the sympathetic nervous system of the Javan has used the atropine test (DANIELOPOLU). The principle of the test is that organs innervated by the vegetative nervous system have a relative tonus which is the resultant of the vago- and sympathicotonus, an example of which is afforded by the frequency of the heart beat. If the vagus component is eliminated by means of atropine, only the sympathetic component remains in action. Another line of investigation dealt with the secretory function of the stomach. This is governed by the vagus. By stimulation of the vagus a larger quantity of gastric juice is formed and its acidity is higher; motility is excited; emptying is quicker; peristalsis is greater and more frequent and the tonus of the stomach wall is higher. Sympathetic action is in the opposite direction. In gastric ulcer gastric secretion is said to be more acid and motility greater than normal.

The author concludes from his tests in Javans that :—(1) Gastric ulcer is infrequent. (2) The atropine test shows no evident dominance of a definite vegetative tonus variation. (3) The gastric juice has a high acidity which may be indicative of a local hypertony of the vagus. (4) The emptying of the stomach is rather more rapid than normal, which is also an indication of local vagus hypertony. (5) No connexion between vegetative tonus and gastric ulcer could be definitely established. *W. F. Harvey.*

Aitken (A. Blair). **Remarks on Peptic Ulcer.**—*West African Med. Jl.* 1933. Apr. Vol. 6. No. 4. pp. 63–65.

The author records 48 cases of peptic ulcer at Lagos in natives of Nigeria, seen in a period of 15 months.

Peptic ulcer is usually regarded in Nigeria as a rarity; in the author's cases the diagnosis was verified at operation: 4 were gastric, 44 duodenal ulcers; 44 were in males. The symptoms had usually been present a matter of years. He notes the degree of induration often present and the frequency and extent of perigastric adhesions. Some degree of pyloric obstruction was common. The percentage of ulcers admitted to the Lagos hospital in 1932 was 0·9 [not 9 as in the table]. The diagnosis is discussed and the difficulties in a country where X-rays and fractional gastric analysis are seldom available. *A. G. B.*

Grillo (J.). Experimentelle Untersuchungen ueber Misch- und Sekundärinfektion. III. Mitteilung: Ueber den Verlauf einer Infektion mit Trypanosomen und Rekurrensspirochäten beim Meerschweinchen. [**The Course of Infection with Trypanosomes and Relapsing Fever Spirochaetes in Guineapigs.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. Apr. 28. Vol. 128. No. 3/4. pp. 252–265. [12 refs.]

The author concludes as follows :—

In guineapigs which are simultaneously infected with nagana and *S. hispanica* the trypanosomes are influenced in the same way as they are in mice: the incubation period of the nagana is lengthened, the flagellates frequently disappear completely from the circulation and the life of the animals is prolonged. It is observed that after the lengthened incubation period the trypanosomes do not correspond with those of the original strain but are relapse modifications; this suggests that the changed course of the trypanosome infection depends on a nonspecific heightening of the specific immunity processes by the relapsing fever. Whereas in guineapigs desplenation, which damages the functioning of the reticulo-endothelium, for some time, accelerates the trypanosome infection, after previous treatment with electro-colloidal copper which causes only a temporary injury to the R.E.S., the course of nagana is delayed as in animals with mixed infections. Since relapsing fever has a similar action on the R.E.S. it must be assumed that the delayed cause of the nagana is due in each case to the same mechanism, namely to over-regeneration of the functioning mesenchymal cells caused by the primary damage to the R.E.S.

A. G. B.

COCHRANE (E.) & BETTENCOURT-GOMES (S. C.). **Glandular Fever in the Tropics.**—*Lancet.* 1933. May 6. pp. 955–956.

HASSELMANN appears to have been the first to report glandular fever from the tropics [see this *Bulletin,* Vol. 29, p. 531].

Seven cases are here shortly described which occurred on the return of a football team from Trinidad to British Guiana. The onset was sudden and simultaneous. They suffered from fever and ten or more days later from enlargement of cervical and other glands, and debility lasting for some weeks. The patients were not seen in the febrile stage. One blood examination is recorded—White cells 8,400 ; polymorphs 31·5 per cent. ; lymphocytes 66 per cent. ; eosinophils 1 per cent. ; large mononuclears 1·5 per cent. Efforts to trace the source of the infection were fruitless. *A. G. B.*

ELLIS (D.). [**The Incidence of Asthma in Port Sudan, with Special Reference to the Influence of Moulds.**]—*Guy's Hosp. Reports.* 1933. Vol. 83. No. 1. pp. 102–111. With 3 graphs. [Summarized in *Rev. Applied Mycology.* 1933. June. Vol. 12. Pt. 6. pp. 370–371.]

" Of the 50 cases of acute asthma investigated by the writer at Port Sudan, 43 developed the disease for the first time after coming to the town, indicating the existence of some asthmogenic factor in the locality. Climate was the first to be considered and it was ascertained that 44 of the patients suffered the most severe paroxysms in the winter. No correlation could be detected between the incidence of asthma and the factors of soil, vegetation, and dust.

" On a damp December day ten Petri dishes were filled with a medium of agar and 10 per cent. glucose, sterilized, and exposed to the atmosphere for nine hours, after which they were covered and five placed in the ice chest and five in the incubator. After three days well-developed colonies of *Aspergillus niger* and *Penicillium glaucum* were observed, 14 or 15 on each plate, those on ice being larger and growing more rapidly. When the experiments were repeated on a relatively dry, hot day in July, only one or two colonies were obtained among all the plates exposed.

" A concentrated emulsion, prepared from living spores of *P. glaucum* (which was found to give more definite reactions than *A. niger*) was injected through epidermal scratches into two of the patients, each of whom developed violent asthmatic and local symptoms within half an hour. In subsequent tests one minim of the standardized mould-containing fluid was injected intradermally on the outer side of the right arm, one minim of the saline solution used for dilution being simultaneously injected into the outer side of the left arm. Numerous control experiments were similarly conducted on normal persons as well as on those suffering from various pathological conditions, none of whom developed positive reactions. All but two of the asthmatic patients, on the other hand, experienced more or less pronounced reactions. Attempts to isolate the fungus from the sputa gave negative results.

"Treatment by a process of desensitization has been instituted in Port Sudan, and so far the outcome has been very satisfactory, both with English people and natives. The injections have been started with single minim doses of the standard suspension and gradually increased to ten minims, the latter dose being applied weekly until the attacks cease. No adverse effects have followed the use of live cultures, and the efficacy of dead ones has not yet been determined."

DE LANGEN (C. D.). **Studies on Blood Diseases and Blood Regeneration in Java.**—*Proc. Roy. Soc. Med.* 1933. Apr. Vol. 26. No. 6. pp. 763–772 (Sect. of Trop. Dis. & Parasit. pp. 37–46).

De Langen has never encountered a case of pernicious anaemia in a native of Java, and the same is true for the anaemia of sprue, which it so closely resembles. Sprue is pre-eminently a disease of the Europeans, not of the 45 million native inhabitants, and this fact is borne out by Army statistics, which force consists of half Europeans and half natives. The racial incidence of the pernicious anaemia cannot, like that of sprue, be explained by the effect of climate; it certainly suggests some relation between these two forms of anaemia, especially as they both react to liver therapy, just as is the case with two other well known diseases, which do not occur amongst Javans, gastric ulcer and carcinoma of the stomach. The question of origin is difficult to determine; if these diseases are avitaminoses they must implicate a different class of substances from that already recognized. In laboratory experiments with diets, the author has succeeded in producing various anaemic conditions, but only by the intramuscular or intravenous injection of linolenic acid has he been able to produce an anaemia of the pernicious type.

The connexion between achylia gastrica and pernicious anaemia is emphasized, but a considerable proportion of ankylostomiasis patients also have achylia gastrica which is histamine-refractory.

Statistics show that pernicious anaemia occurs less frequently amongst people living in Southern countries, and the percentages of mortality in various countries, without discrimination of race, are as follows:—

North America	From 6·9–9·1
Norway and the Netherlands	,, 4·4–8·9
Italy	2·3
Ceylon and Japan	From 0·3–0·6
Java	None

Blackwater Fever seldom appears amongst the indigenous population of Batavia. It occurs frequently amongst the newcomers—the Europeans, Japanese and Chinese. The author has examined many cases in Java, but has never found a really clear instance of haemoglobinaemia; occasionally he has found bands of methaemoglobin, and this in his opinion indicates a grave prognosis. He has made numerous experiments to determine the concentration of the haemoglobin in the plasma before excretion in the urine takes place.

By the injection of small quantities of linolenic acid in rabbits, a definite haemoglobinaemia is produced, but only when this becomes very obvious is the kidney threshold passed and haemoglobinuria ensues. Possibly this point can be ascertained more simply by dietary experiments, as in rabbits fed on a diet rich in lecithin. He has been forced to conclude that haemolysis in blackwater fever does not take place in the blood stream, but more probably in the kidneys.

Ankylostomiasis.—The causation of anaemia in this condition has been explained, either by the chronic loss of blood through the intestinal canal, or by the action of toxins secreted by the worms themselves. It is possible by chemical tests in this disease to demonstrate the presence of blood in the faeces in the majority of cases, and in trials on healthy persons, by the administration of blood *per os*, it is shown that not more than 2–3 cc. is necessary to give the reaction to the same intensity as that obtained in ankylostomiasis. This quantity is very small indeed compared with that physiologically destroyed. He therefore concludes that there is no increased haemolysis in this disease, but, on the contrary, the destruction of blood is less than normal and points to an aplastic condition, or injury of the bone marrow as the cause.

Blood regeneration.—In his investigations in Batavia on this subject, the author has used the Terwen method and has applied LICHTENSTEIN'S calculations. By this method the total quantity of urobilinogen excreted daily in the faeces is determined, and from this the corresponding quantity of haemoglobin is calculated. In Holland Lichtenstein found that the amount of urobilin excreted varies between 125 and 150 mgm. and according to these calculations the person consumes his own blood in 140 days. In ten healthy native males the author found an average excretion of 115 mgm. over a period of ten days, which corresponds to a maximum life span of the corpuscle of 174 days, and in 5 severe cases of ankylostomiasis, the excretion was even less, so that in this disease there appears to be a much slower rate of blood destruction than normal. As the result of various investigations, he believes that diet exercises a great influence on the rate of blood destruction and regeneration.

Resisting Power of Corpuscles.—The haemolytic power of the lipoid layer of the corpuscles can be expressed in the quotient $\frac{\text{cholesterin.}}{\text{lecithin.}}$ It is considered that this co-efficient is governed by diet. In fasting animals and in rabbits fed only on grass and turnips, the resistance increases, but regeneration decreases at the same time. The author found that if a grass-fed rabbit was bled, it took a long time before the blood condition again became normal; but if the animal be fed on oats, a large number of reticulocytes appeared, and the number of red cells is restored in half the time taken by the grass-fed animal, while the addition of lecithin to a turnip or grass diet, has the same effect as that of pure oats.

From the observations on the lecithin and cholesterin content, it appears that in the process of blood destruction and regeneration, it is not the concentration of the different lipoid and fat fractions that is the important factor, but their mutual relations, and this balance depends upon the nature of the diet.

The Impulse to Blood Regeneration.—The impulse to blood regeneration by the marrow can be effected by products set free from destroyed erythrocytes in conformity with MIYAGAWA'S theory of auto-regeneration. The author has found that the injection of whole blood provokes a good reaction, but not so great as that following the use of haemolysed corpuscles, and that bilirubin exerts a haemopoietic action on anaemic animals, but less than that produced by haemolysed red cells. The injection of splenic tissue has a different effect. Here recovery from anaemia is slower than usual, but the number of reticulocytes is increased in proportion to the degree of anemia, thus indicating stimulus of the marrow; but here again the effects of diet must be taken into consideration. *P. H. Manson-Bahr.*

AZMY (Soliman), EFFAT (Sayed) & NESHOUKATI (H.). **An Investigation of Anaemias in Egypt. Analysis of Fifty Consecutive Cases.**—*Jl. Egyptian Med. Assoc.* 1933. Apr. Vol. 16. No. 4. pp. 258–267.

Of the 50 consecutive cases of anaemia 4 were associated with chronic gastritis, 20 with ankylostome infection and 25 with chronic dysentery, chiefly bilharzial with or without ankylostomiasis.

In the dysenteric series the factors responsible for the production of anaemia were (1) loss of blood in the stools—a minor factor: (2) ankylostoma infection: (3) deficient absorption of iron due to the associated gastro-enteritis. When large doses of iron are given to make up for this, especially when dilute HCl is given as well, sufficient iron is absorbed and the anaemia improves. The improvement in the blood picture was strikingly independent of the improvement in the local dysenteric condition.

In the ankylostome series the probable factors in the production of the anaemia were (1) blood loss from the bowels—a very important one [see WELLS, this *Bulletin*, Vol. 29, p. 421, where 0·84 cc. is the daily loss to be debited to each worm]: (2) a "toxic anhaemopoietic" factor put in evidence by a low reticulocyte count.

The authors give details of their five cases of chronic gastritis anaemia and note that "recent work is tending to reduce all primary anaemias to terms of failure of gastric function." The treatment of the 50 cases that gave the best results was inorganic iron by mouth in the form of ferrous sulphate exsicc. 0·30 gm. t.d.s. or reduced iron 2 gm. t.d.s. with dilute HCl in cases of achlorhydria. *A. G. B.*

NEGRONI (P.) La déviation du complément dans les affections cutanéo-muqueuses à Monilia. **[Complement Deviation in Muco-Cutaneous Affections due to Monilia.]**—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 476–478.

The author demonstrated that inoculations of *Monilia albicans* may produce intertrigo, vaginitis and onychia, and that antibody is constantly present in the serum of such subjects after a period of 20 days. Formol-saline extracts of monilia cultures were used as antigen, the technique being similar to that of the Wassermann reaction. Nineteen cases of cutaneous moniliasis were studied; 13 were strongly positive (+++), 3 were weakly positive (+) and 3 yielded doubtful types of reaction. When the duration of the lesion exceeded 20 days positive results were obtained in 84 per cent. of cases. *N. Hamilton Fairley.*

WALCH (E. W.) & DE MOOR (C. E.). In den Tropen erhaltene Resultate der Untersuchung von Fäzes und Harn auf Typhusbakterien mit Einschaltung der Mullerschen oder Kauffmannschen Nährböden. **[Effect of Interpolation of Muller or Kauffmann's Media in the Examination of Faeces and Urine for Typhoid Organisms.]**—*Zent. f. Bakt.* I. Abt. Orig. 1933. June 12. Vol. 128. No. 7/8. pp. 530–536. With 1 fig.

This investigation was concerned with the possibility of improving results by inoculation of faeces and urine in Muller's medium (sod.

tetrathionate) or in Kauffmann's medium (sod. tetrathionate with 1–100,000 brilliant green) before planting out on chloral-Endo plates. Addition of 1–1,000 chloral to an Endo plate prevented overgrowth by proteus bacilli while typhoid organisms were not affected. Dysentery organisms, however, were inhibited in their growth. Neither the Muller nor the Kauffmann method was successful for the isolation of dysentery organisms. No satisfactory enrichment medium for Paratyphoid A bacteria exists. Both the above enrichment methods are better than direct plating for paratyphoid food poisoning organisms. Muller's method was inferior to the direct method in the case of typhoid bacteria, while the Kauffmann method in combination with the chloral hydrate Endo plate gave as good, but no better results.

W. F. Harvey.

DAVID (J. Christodoss) & VAREED (C.). **The Action of Quinamine on the Heart.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 1005–1008. With 2 graphs.

CHOPRA and DAVID (1927) published the first account of the pharmocological action of quinamine, an alkaloid of cinchona bark, isolated by HESSE. The work here described was undertaken to ascertain whether the drug would be useful in the treatment of auricular fibrillation. In dogs and cats it was found to cause a fall of blood pressure, and in small doses an apparent stimulation of the auricle ; no favourable effect on experimentally induced auricular fibrillation. *A. G. B.*

LAL (S.). **A Preliminary Report on the Active Principle of Bael.**—*Jl. Indian Med. Assoc.* 1933. June. Vol. 2. No. 10. pp. 391–395. With 11 graphs.

Bael fruit pulp yields a substance Marmelosin, pharmacologically very weak, for very large doses are required to produce any action on any organ. It acts directly on the muscular tissue. The actions of Liq. Ext. of Bael and of Marmelosin are similar. Inhibitory action of Marmelosin on peristaltic movements of gut can help to check those cases of diarrhoea due to excessive stimulation of motor activity. Tone increase is too slight to be of any consideration. But the facts that the amount of Marmelosin in Bael is little, and that very high doses of it are necessary to produce an action in experimental animals, lead to the conclusion that it plays little or no part in Bael therapeusis. At this stage it can only be said that action of Bael in diarrhoea and dysentery must be due to the quantity of mucilage and tannin present in it. *H. M. Hanschell.*

ABBATUCCI (S.). Le climat tropical—l'acclimatement.—*Rev. d'Hyg. et de Méd. Préventive.* 1933. July. Vol. 55. No. 7. pp. 505–526.

BYAM (William). The Treatment of Invalids from the Tropics at Spas.—*Brit. Jl. Physical Med.* 1933. June. Vol. 8. No. 2. pp. 26–27.

DUBOIS (A.). L'organisation de l'hygiène au Congo Belge.—*Arch. Méd. Belges.* 1933. June. Vol. 86. No. 6. pp. 117–132.

COPPLESON (Victor). Shark Attacks in Australian Waters.—*Med. Jl. Australia.* 1933. Apr. 15. 20th Year. Vol. 1. No. 15. pp. 449–467. With 8 figs. [37 refs.]

Epstein (Stephane). Local Immunity in Therapeutics. [Translated from the French by Cyril C. **Barnard**, B.A.]—62 pp. 1933. Paris: Librairie E. Le François, 91 Boulevard Saint-Germain.

Fairbairn (H.). Tabes Dorsalis in an East African Native.—*Brit. Med. Jl.* 1933. Aug. 26. p. 382.

Fernandez Martinez (F.) & **Suarez Peregrin** (E.). Estudio parasitologico de cien casos de diarrea en Granada.—*Medicina Países Cálidos.* Madrid. 1933. May. Vol. 6. No. 3. pp. 177–195. [52 refs.]

Gauguet. De quelques maladies épidémiques ou endémiques au Sénégal.—*Arch. Méd. et Pharm. Nav.* 1933. Apr.–May–June. Vol. 123. No. 2. pp. 192–214. With 2 charts.

Gilks (J. L.). The Medical Department and the Health Organization in Kenya, 1909–1933.—*East African Med. Jl.* 1933. Mar. Vol. 9. No. 12. pp. 340–354.

Hasselmann-Kahlert (Marg.). Meine " superkalorische " Säuglingsnahrung mit besonderer Berücksichtigung des Energiequotienten beim Säugling in den Tropen.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Sept. Vol. 37. No. 9. pp. 399–408. With 3 figs.

Huisman (R. G. J. P.). Een geval van plasmochine-intoxicatie.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Mar. 15. Vol. 72. No. 6. pp. 361–362.

Khouri (J.). Caractères morphologiques et biochimiques d'une *Monilia* isolée des crachats d'un malade atteint de blastomycose pulmonaire.—*Bull. Soc. Path. Exot.* 1933. Jan. 11. Vol. 26. No. 1. pp. 7–9.

Kouwenaar (W.). Jicht.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1932. Vol. 72. No. 25. pp. 1682–1689.

Kwaschnina (A.). Ueber die Biologie der Vibrionen der Sommerdiarrhoen.—*Zent f. Bakt.* I. Abt. Orig. 1933. May 22. Vol. 128. No. 5/6. pp. 405–412. [10 refs.]

Lefèvre. Les maladies transmissibles dans les colonies françaises et territoires sous mandat pendant l'année 1930.—*Ann. de Méd et de Pharm. Colon.* 1932. Apr.–May–June, July–Aug.–Sept Vol. 30. Nos. 2 & 3. pp 296–405; 546–569.

Lepeuple. Les centres de repos de Cochinchine.—*Arch. Méd. et Pharm. Nav.* 1933. Apr.–May–June. Vol. 123. No. 2. pp. 181–192. With 12 charts & 2 figs.

Mattlet (G.). Note sur l'emploi du bouillon antivirus de Besredka en thérapeutique coloniale.—*Ann. Soc Belge de Méd. Trop.* 1933. June 30. Vol. 13. No. 2. pp. 183–186.

de **Mello** (I. Froilano). Sur une nouvelle espèce de Scopulariopsis (*S. sehnsuchta*) trouvée à l'Inde Portugaise.—*Archivos da Escola Med.-Cirurg. de Nova Goa.* 1932. Ser. A. No. 8. pp. 1367–1378. With 4 plates.

Rogers (Leonard). What Tropical Medicine owes to Animal Experiment. Stephen Paget Memorial Lecture.—*Brit. Med. Jl.* 1933. July 1. pp. 18–19.

Ronnefeldt (F.). Die Gonorrhoe in West-Liberia.—*Dermat. Woch.* 1932. May 21. Vol. 94. No. 21. pp. 717–723.

van **Slype.** A propos du traitement de l'ulcère tropical.—*Bull. Méd. du Katanga.* 1933. Vol. 10. No. 2. pp. 33, 35–37.

Soesilo (R.). Snelkleuring van dikke druppels.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Aug. 1. Vol. 73. No. 16. pp. 982–984. With 2 figs. on 1 plate.

Surbek (K. E.). Ueber einen Fall akuter Tropika-Nephritis.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Aug. Vol. 37. No. 8. pp. 387–389.

Tillema (S.). Pyomyositis tropica.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. June 6. Vol. 73. No. 12. pp. 760–761.

Trolli (G.). Résultats d'une enquête sur la présence et la vitalité des insectes et rats et notamment des moustiques à bord des avions de la ligne Léo-Stanleyville.—Reprinted from *Bull. Inst. Roy. Coloniale Belge.* 1932. Vol. 3. No. 3. pp. 601–630. With 7 folding tables.

REVIEWS AND NOTICES.

STANNUS (Hugh Stannus) [M.D., Ph.D. (Lond.), F.R.C.P. (Lond.), M.R.C.S. (Eng.), D.T.M. & H. (Cantab.), etc.]. **A Sixth Venereal Disease. Climatic Bubo. Lymphogranuloma Inguinale. Esthiomène. Chronic Ulcer and Elephantiasis of the Genito-Ano-Rectal Region. Inflammatory Stricture of the Rectum.**—pp. xii+270. With 9 plates. 1933. London : Baillière, Tindall & Cox, 7 & 8 Henrietta Street, Covent Garden, W.C.2. [12s. 6d.]. [Review appears also in *Bulletin of Hygiene.*]

The identity of climatic bubo with lymphogranuloma inguinale has now been established, as also the fact that the disease is conveyed by venereal infection. This justifies the author's main title, " A sixth venereal disease," the other five V.D.'s being, syphilis, gonorrhoea, chancroid, the genital infection of Vincent's organism, sometimes called " the Fourth Venereal Disease " and Granuloma Venereum, or Ulcerating Granuloma of the Pudenda. The present work is an exhaustive critical review of the literature on the conditions mentioned , it will be found very valuable as a work of reference and particularly so by English and American readers since most of the articles reviewed are in other languages. (In the first 435 of the author's 933 references, which date from the year 1786, only 44 of the articles had appeared in English or American journals or books.)

The more important articles have appeared in the last five or six years and have been summarized by the author in this *Bulletin.* So far, however, the subject has been by no means clearly dealt with in text books on V.D. At the same time, it is highly important that workers in V.D. Treatment Centres should be well acquainted with it because the disease appears to be increasing on the Continent, and there is a strong possibility of its doing so in this country. In such an event the danger of its being overlooked, or confused with bubo resulting from chancroid, is likely to be prevented by a study of this book.

After historical reviews of lymphogranuloma inguinale and climatic bubo and establishment of the identity of the one with the other, the geographical distribution, clinical manifestations, aetiology, pathological changes, diagnosis and treatment are dealt with fully, including the important skin tests introduced by FREI. The work also includes a review of the literature on experimental transmission to lower animals and then presents the weighty evidence supporting the close aetiological relationship of lymphogranuloma inguinale to the conditions known as esthiomène, elephantiasis of the genito-ano-rectal region and inflammatory stricture of the rectum.

In a special chapter the author discusses the nomenclature, which is at present unsatisfactory. He favours the term " poradenitis " for climatic bubo and lymphogranuloma inguinale, while for certain sequelae one might use such terms as " poradenitic elephantiasis " " poradenitic stricture of the rectum " and (for esthiomène) " the poradenitic genito-ano-rectal syndrome."

The author has performed a valuable service in compiling this book, which must have entailed an immense amount of labour. It clarifies a subject that must, hitherto, have appeared very confusing to many of those who are likely to encounter the disease in their clinical work.

L. W. Harrison.

MCAUSLAND (Stuart) [B.A.(Lond.), M.D., Ch.B.(Liv.), M.R.C.S.(Eng.), L.R.C.P.(Lond.), etc.]. **The Cure of Haemorrhoids, Varicose Veins and Ulceration, and Allied Conditions : by Modern Methods of Injection and Bandaging.**—pp. vi+63. With 11 illustrations. 1933. London : John Bale, Sons & Danielsson, Ltd. [3s. 6d.].

The author in a foreword states that this book is based upon a " haemorrhoid " experience of eleven years and over 1,000 cases ; and a

" varicose vein " experience of seven years and over 3,000 cases. He advocates the now well known 'injections'—quinine urethane mixture for varicose veins by the empty vein technique; and carbolic acid in almond oil for internal haemorrhoids. His respective injection techniques are carefully described and the book must be of undoubted value to any practitioner who wishes to undertake these treatments. Those already experienced will perhaps envy the author his enthusiasm after so large an experience, but nevertheless remain of opinion that the enthusiasm is too uncritical. *H. M. Hanschell.*

GHOSH (Birendra Nath) [F.R.F.P. & S. (Glas.), etc.]. **A Treatise on Materia Medica and Therapeutics including Pharmacy, Dispensing, Pharmacology and Administration of Drugs.** 13th Edition.—pp. xv+712. With 3 figs. 1933. Calcutta: Hilton & Co.; and London: H. K. Lewis & Co., Ltd. [Rs. 7/8—or 12s. 6d.]

A book which is in its thirteenth edition does not call for a detailed review. Clearly it has met a need. It is not therefore necessary to do more than indicate its contents. The work is divided into seven parts—Materia Medica Proper (pp. 1–47); Pharmacy and Dispensing (pp. 48–73); Administration of Drugs (pp. 74–90); Pharmacology and Therapeutics (pp. 91–628); Vaccine and Serum Therapeutics (pp. 629–654); and Organotherapy, Radiation Therapy and Indian Indigenous Drugs (pp. 659–712). The preface speaks of drastic revision necessitated by the publication of the British Pharmacopoeia, 1932, and that the work is up to date is shown by the inclusion of atebrin and other drugs of recent introduction in tropical medicine. The work would appear to be a useful source of reference on the subjects with which it deals. *A. G. B.*

KIKUTH (Walter). **Die Bartonellen und verwandte Parasiten bei Mensch und Tieren.** [The Bartonellas and Related Parasites in Man and Animals.]—Reprinted from *Ergebnisse d. Hyg. Bakt. Immunitätsforschung u. Experim. Therap.* 1932. Vol. 13. pp. 559–619. With 12 text figs. [10 pages of refs.]

In the review of KIKUTH's article on Bartonellas and allied organisms (this *Bulletin*, Vol. 30, p. 572) the discovery of Bartonella in the blood of splenectomized rats is erroneously attributed by the reviewer to LAUDA. This observer, as the article points out, noted the anaemia which developed in these animals after splenectomy but failed entirely to discover any organism to account for it. He concluded that an ultramicroscopic virus would prove responsible. On learning of LAUDA's work Martin MAYER suspected that the cause of the anaemia was probably *Bartonella muris* which he had described in 1921. He quickly demonstrated the appearance of the parasite in the blood of rats subjected to splenectomy, a fact overlooked by LAUDA, and proved that it was actually the cause of the anaemia as he had suspected. *C. M. Wenyon.*

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 30.] 1933. [No. 12.

MALARIA.

BARBER (M. A.) & FORBRICH (Louis R.). **Malaria in the Irrigated Regions of New Mexico.**—*Public Health Rep.* 1933. June 2. Vol. 48. No. 22. pp. 610–623. With 1 map.

This paper deals with the spreading of malaria in new areas, and recommends Gambusia as an antilarval agent. The introduction of these fish has already proved effective in some districts.

Malaria is now present in irrigated river valleys which lie within three widely separated areas of the State, at elevations of 4,000 to 5,600 feet. In two of these, it appears to be of recent origin and the author fears that it may spread to other districts, especially where land is being reclaimed from alkali by large drainage ditches. The local anopheles are *A. maculipennis*, *A. pseudopunctipennis*, and *A. punctipennis*. The carrier is *A. maculipennis* which shows the same propensity to haunt the house where it has fed which has been noted in Europe. Drainage has little value as an antilarval measure in an irrigated region ; indeed, the drainage ditches constructed to prevent water-logging are the chief producers of anopheles in southern New Mexico. Alfalfa and sweet clover are common, Chara is abundant, there are millions of bats in some places, but none of these have any apparent effect in checking mosquitoes. " Larvicides may be necessary to do away with a mosquito nuisance, or for local or temporary protection against malaria, but it is doubtful whether they can be profitably used year after year on a country-wide basis." The most promising measures are the wide dissemination of Gambusia, the treatment of carriers, education regarding treatment and screening, and prevention of the improper use of irrigation water. The malaria parasite rate has already fallen in some districts since Gambusia was introduced.

W. Fletcher.

WASHBURN (B. E.). **An Epidemic of Malaria at Falmouth, Jamaica, British West Indies.**—*Amer. Jl. Hyg.* 1933. May. Vol. 17. No. 3. pp. 656–665. With 3 maps.

This epidemic occurred after excessive rainfall following a drought during which clearing of forest and interference with drainage had occurred.

Falmouth is situated on the north coast of Jamaica and is surrounded by a brackish swamp on the landward side. The swamp is divided into two parts by a road passing inland from the town, but they communicate by means of a culvert, and a flow of saline water coming through this from the eastern side maintains the salinity of the western swamp. There is very little malaria as a rule, and the only carrier is *A. albimanus*; but, in 1931, there was an epidemic of malignant tertian which affected more than half the population of 8,000 and caused 138 deaths. The rainfall during the two years preceding this epidemic was abnormally low, so that the swamp behind the town became practically dry; people were therefore able to go into it, and they made large clearings by cutting down the mangrove trees for fuel. They also, for some unknown reason, closed the communicating culvert between the two swamps. An abnormally heavy rainfall in 1931 followed the two years of drought, and the town was surrounded by large sheets of fresh water. The swamp on the western side, cut off by the blocking of the culvert, became filled with fresh water in which algae grew. This was followed by a great increase in anopheline breeding and an outbreak of malaria. It was controlled by Paris green dusting, and the filling of small pools in the town. "The most important control measure, however, was the reopening of the channel under the bridge—to permit sea water to enter again the large morass." *W. F.*

MANSON (D.) & RAMSAY (G. C.). **Further Observations on a Malaria Survey in the Jorhat District, Assam, with Some Notes on the Anti-Malaria Measures Employed.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 479–494. With 2 folding graphs.

A. umbrosus is widely distributed but does not feed on human blood. Heavy rains make Paris green less effective than oil. Planting for shade is dealt with.

The authors give a list of 18 anopheles which they have identified in Jorhat; they have confirmed their previous conclusion (p. 64, above) that *A. minimus* is the important carrier of the district. *A. umbrosus*, which breeds in denser shade than any other species in Assam, was specially studied, because the shading of streams by planting undergrowth has been adopted as an antilarval measure. It has been incriminated as a carrier in the Malay States, but no specimens were found in human habitations or cow-sheds by the authors, and though it attacks man ferociously in the jungle during the daytime, none could be caught in buildings at night. Near a breeding-place of *A. umbrosus*, only *A. minimus* and *A. philippinensis* were found in human habitations; *A. hyrcanus*, *A. barbirostris* and *A. philippinensis* were found in cattle-sheds.

The heavy rain in Assam makes Paris green less useful than in drier countries. If rain falls within 3 hours of its application it should be dusted again immediately. It does not destroy vegetation and can be used where efforts are being made to establish dense shade. Formerly, oiling was carried out with a mixture of crude oil and kerosine, but the coolies stole the kerosine, and now a mixed oil, called Malariol, is obtained from the Burmah Oil Company, at six annas a gallon; one gallon is sufficient for 250 lineal yards of one edge of a stream. Particulars are given of the various shrubs and trees which are planted along ditches and water-courses in order to provide the dense shade which renders them unsuitable for the breeding of *A. minimus*. Duranta hedges take about 2 years to grow, before they give sufficient shade; in the meantime, Paris green must be used. "Bamboo matting can be anchored to the banks of tanks, and this effectually stops the breeding of *A. minimus*." It can also be used to cover narrow, tea section drains. The winter breeding places of *A. minimus*, on some highly malarious tea estates, are as far distant as 8 miles from their normal summer resorts around the coolie lines ; it is, therefore, futile to attempt to control the winter breeding. [See also WALLACE, p. 89, above.] *W. F.*

FARINAUD (M.). Recherches sur la valeur comparée et les corrélations des indices endémiques palustres au Tonkin. [**The Comparative Value of the Indices of Endemic Malaria in Tonking.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 819–828. [15 refs.]

Investigations of the splenic and the parasitic indices of children in Tonking gave similar results. The splenic index afforded more exact results in 1931, when there was much malaria ; the parasitic index was more exact in 1932 when there was less malaria. The author found that infection with *P. malariae* produced the largest spleens ; but, in the discussion which followed the paper, Professor MARCHOUX stated that therapeutic inoculations in non-malarious countries had shown that the biggest spleens occurred in *P. vivax* infections. *W. F.*

SCHWETZ (J.), BAUMANN (H.), PEEL & DROESHAUT. Etude comparative de la malaria chez les pygmées et les indigènes ordinaires de la forêt de l'Ituri (Congo Belge). [**A Comparative Study of Malaria among the Pygmies and the Ordinary Natives of the Ituri Forest.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 639–651. With 1 plate.

The pygmies are nomad hunters of the jungle, but the ordinary natives are agriculturists who live in permanent villages. As regards malarial infection, there is little difference between them, but the pygmies are very anaemic. This anaemia, which is characterized by anisocytosis and poikilocytosis, is associated with the presence of an enormous number of eosinophiles. The authors consider that the anaemia is probably due to helminthiasis ; the evidence is not given here. *W. F.*

VAN HELL (J. C.). De malaria te Weltevreden, Batavia en Tandjong Priok in het jaar 1931. [**Malaria in Weltevreden, Batavia and Tandjong Priok in 1931.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1933. Vol. 22. No. 1. pp. 1–13. With 1 fig.

The salt water fish ponds of Batavia are fertile breeding places of the malaria carrying mosquito *A. ludlowi*. Active measures were taken, not to drain them, but to free them from the algae which covered their surface. This was intended to render them harmless from a malarial point of view and was a comparatively inexpensive procedure. A kampong situated in the midst of clean fish ponds could show a spleen index of only 14 per cent. while in some kampongs of old Batavia the index might be as high as 80 per cent. The spleen index, taken in 1931 to determine the effect of these measures, which had been begun in the middle of 1928, showed especially in the more northerly situated kampongs of Batavia a definite diminution compared with those of 1917. Mortality rates, too, had fallen from 49 per mille in 1921 to 27 per mille in 1931, a figure which was but little higher than in Samarang and Soerabaja. *W. F. Harvey.*

WALCH (E. W.). Over de gezondmaking van Banjoewangi. [**Antimalarial Measures in East Java.**]—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1933. Vol. 22. No. 1. pp. 16–19. English summary (7 lines).

In Banjoewangi (East Java) the nuisance of marine fish-ponds breeding Anophelines was abolished by cutting through the dikes and giving the tidal water free access. At Tandjong Priok (W. Java) this method failed owing to the small tidal fluctuation, and for this and other reasons it is not recommended elsewhere in Java. [A successful method is to lay the ponds dry once a month (this *Bulletin*, Vol. 27, p. 640).] *A. G. B.*

MEZINCESCU (D.), PETER (F. M.) & CORNELSON (D. A.). Epidemiologische und therapeutische Malariastudien in Suliman. (1. Bericht der Malariaforschungsstation in Gurbanesti.) [**Studies of Malaria in Suliman (Rumania). Report I. of the Malaria Research Station at Gurbanesti.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 223–251. With 4 figs. [12 refs.]

This is the first report of an extensive epidemiological research and field investigation, which was started at the malaria station of Gurbanesti (Rumania) in 1930, with the object of studying the endemic malaria of the district and practical methods for its control.

The value of drug control forms the chief part of the investigation and the problem is being dealt with according to the following plan :—

In the following villages all parasite carriers are treated by standard schemes :—

1. In Gurbanesti by quinine. 2. In Ciofliceni by plasmoquine. 3. In Valea Presnei by quinoplasmoquine. 4. In Suliman by atebrin-plasmoquine. Other villages are being left without drug treatment, the parasite and spleen index being determined in them, and they act as controls. In the present report the investigations in the villages of Suliman are dealt with; the other investigations will form the subject of future reports. Suliman lies on the banks of a large expanse of sluggish water (100 km. long). The chief carrier of malaria is *A. maculipennis*. The blood examination of the inhabitants was carried out by thick and thin films. The blood from each was examined by two observers.

The following table shows the age distribution of the inhabitants of Suliman in comparison with the infection rate :—

Age groups	Number of inhabitants	Number of infected	Parasite index in age groups
			%
0—4 years	51	28	54·9
5—9 ,, ...	43	28	65·1
10—14 ,, ...	28	9	32·1
15—24 ,, ...	57	12	21·1
25 ,, ...	110	22	20·0
Total	289	99	34·2
0—24 years	179	77	43·0

It will be seen that the parasite rate from 0–24 years, 43 per cent., is nearly double that of the population group over 25 years, 20 per cent.

The distribution of malaria parasites according to age is :—

	Children under 12 years	12—24 years	25—80 years	Total
P. vivax	45	8	13	66
P. falciparum	9	6	8	23
P. malariae	Nil	Nil	Nil	Nil
Mixed infections (*P. vivax* and *falciparum*)	9	—	1	10
Total	63	14	22	99

The spleen index in August 1930 was 12·8 per cent., and in February 1931, 16·1 per cent. The drugs were well tolerated by the inhabitants, in a few cases yellow pigmentation of the skin was produced by the atebrin, and gastric pain was complained of by 8 patients taking plasmoquine.

The authors are not yet in a position to draw definite conclusions from the results of the researches. Before the commencement of the atebrin-plasmoquine treatment the parasite index of the population was 33·6 per cent., and 9 months after the completion it was 11·4 per cent. In 76 cases treated with atebrin-plasmoquine the relapse rate was 13·2 per cent. All cases treated with atebrin alone relapsed as the result of too small doses. The next publication will deal with the results in Suliman in 1932–32 and the results obtained in the other villages.

E. D. W. Greig.

Moutoussis (C.). Recherches sur l'anophélisme et le paludisme en Grèce. [**Anophelism and Malaria in Greece.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 584–590.

The three principal carriers are *A. maculipennis*, *A. superpictus*, and *A. elutus*. The relative susceptibility to infection is shown by the following figures of sporozoite infection among the three species as caught in two refugee camps where the splenic index was 95 :—*A. maculipennis*, 0·9 per cent. ; *A. superpictus*, 2·7 per cent. ; *A. elutus*, 5·4 per cent. *A. maculipennis* is a mosquito of spring and early summer : *A. elutus* belongs to summer and early autumn : *A. superpictus* to late summer and autumn. *A. elutus* differs from *A. maculipennis*, in size, colour, wing markings and eggs. It breeds in the coastal districts and in the neighbourhood of the salt marshes. The Grecian race of *A. maculipennis* lays eggs with black bands and broad floats. These striated eggs resemble those of Falleroni's *variatio messeae*, which has been found by Martini, Missiroli and Hackett in those places where there is anophelism without malaria. In malarious districts, such as the Roman Campagna, they found Falleroni's *variatio labranchiae*, which lays grey eggs with narrow floats. The author states that in many malarious parts of Greece, *A. maculipennis* of the *messeae* type, is the only anopheline, and he thinks that the activity of *A. maculipennis* as a carrier of malaria depends more upon local conditions than upon racial differences. Malignant tertian malaria, in the mountain villages of Greece, is carried by *A. superpictus*. [See VAN THIEL, below, p. 831.]] *W. F.*

SWELLENGREBEL (N. H.). **Report on a Small Experimental Epidemic of Benign Tertian Malaria started in September 1931 and followed up till January 1933.**—Reprinted from *Proc. Roy. Acad. Sci. Amsterdam.* 1933. Vol. 36. No. 2. pp. 234–239. With 2 graphs.

Neither atebrin nor plasmoquine plus quinine gave better results than quinine alone in this small epidemic.

This concerns the further history of 15 volunteers infected with benign tertian malaria during the test of plasmoquine as a prophylactic, made by the author and DE BUCK (see this *Bulletin*, Vol. 29, p. 357). The drug failed to prevent infection, and the 15 volunteers had 54 attacks—counting relapses. Twenty-three attacks, treated with quinine plus plasmoquine, were followed by 17 relapses; 17 treated with quinine alone, by 12 relapses; 13 treated with atebrin alone or with plasmoquine, by 9 relapses. The incubation period prior to the primary attack was very short, except in one case, because all the volunteers were bitten by as many as 5 to 12 mosquitoes; this probably explains the failure of atebrin to prevent relapses. The primary attacks took place in the autumn, and the bulk of the relapses occurred in the following spring. A graph of these cases is almost identical with a graph representing the history of 30 patients of Dr. KORTEWEG who had their primary attacks at Wormeveer in the autumn, and the author concludes that "every spring case is a repetition of a usually latent, but occasionally patent, primary manifestation of malaria during the preceding autumn. The patent autumnal primary attacks of our experiment have occasioned a vernal epidemic which is the exact replica of a typical Dutch epidemic." *W. F.*

FERMI (Claudio). [La malaria e la decadenza delle civiltà.] [**Malaria and the Decadence of Civilization.**]—Decadenza, risanamento e risorgimento delle regioni malariche. Sardegna, Grottaferrata 1932. p. 116. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 356–357.]

Fermi has studied the history of Sardinia with reference to the part played by malaria in the decadence of the population and decides that its influence has been small.

He finds that the desertion of the lowlands for the hills had nothing to do with malaria but was the result of frequent raids on the coast. Sardinia like some other malaria-stricken places has a high birth-rate. The death-rate is not specially high compared with the provinces of Italy. For infant mortality malaria has less significance than irrational feeding and care of children. Such diseases as plague, influenza, syphilis weaken the population more than malaria. He attributes significant influence to alcohol, malnutrition, earthquakes and especially wars. In the decline of agriculture the first place is given to wars, faulty management, bad customs, floods and climatic changes. [This account is taken from the German summary.] *A. G. B.*

Southern Medical Journal. 1933. May. Vol. 26. No. 5. pp. 447–473.—**Symposium on Malaria.** [17 papers.]

Five of the papers read are here noticed, their subjects being—The health departments should deal with malaria as with other infectious diseases. Transport of *A. costalis* from Africa to Brazil. The two races of *A. maculipennis*. Convict labour for drainage. Suitable housing. The other 12 papers are noted by title on pp. 868–871.

The Chairman, Dr. E. L. Bishops, in his opening address, emphasized the point that the control of malaria does not differ in principle from that of other communicable diseases, such as tuberculosis and syphilis. It should not be set up as an independent service, but should be made a part of the general program of a local, whole-time, health department, with supplementary service from the central health organization in respect to malaria survey and scientific investigation. It should be remembered that control must be continued over a period of years and perhaps indefinitely.

Drs. H. E. Meleney, Carrol Faust, and G. E. Riley presented a report on some recent advances in the epidemiology of malaria. They drew attention to Shannon's (this *Bulletin*, Vol. 27, p. 912; Vol. 29, p. 131) discovery of *A. costalis* in the town of Natal on the coast of northern Brazil, where it appeared to have been responsible for a severe outbreak of malaria. It was supposed to have been imported by one of the fast French mail steamers which make the trip from the West Coast of Africa in 4 days— "a striking example of the danger of rapid travel in modern times in creating new malaria problems." The work of W. C. Earle in Porto Rico was mentioned: he incriminated *A. albimanus* as the important vector, and demonstrated the close relationship between the cultivation of sugar cane and the occurrence of malaria. The authors also attempted to correlate the work of Hackett and Missiroli, Buck, Schoute, and Swellengrebel, La Face and others, on Falleroni's two races—*labranchiae* and *messiae*—of *A. maculipennis*. *Labranchiae* occurs in malarious areas; prefers brackish water; frequents human habitations; does not go into complete hibernation; digests blood in winter; breeds in captivity; is a short-winged race; lays dappled-grey eggs, with small floats which have no network in the intercostal film; has a palmate structure on the second segment of its larva; has a conical claspette in the male adult. The *messiae* race predominates in the fresh inland waters of Italy, Germany and Holland, and in non-malarious zones: it frequents stables in preference to houses; goes into complete hibernation; does not digest blood in winter; does not breed well in captivity; is a long-winged race; lays an egg which is irregularly pigmented in bars and has large floats with a network in the intercostal film; has branched hairs on the second larval segment; has a quadrilateral claspette. (See van Thiel, below p. 831). The *labranchiae* race appears to have definite affinities with *A. elutus*, an important vector in Palestine. Studies directed by R. B. Hill in the central plateau of Spain showed that *A. maculipennis* had a flight range of more than 2½ miles.

Mr. Bruce Mayne, Special Expert, U.S. Public Health Service, dealt with the application of mosquitoes in malaria therapy. The special advantages of employing mosquitoes, instead of injections of blood, are portability and the maintenance of the virus over long periods when infective blood is unobtainable. Mosquitoes can be stored unfed for 2 months at 50°F. Anopheline eggs can be kept at temperatures of 38° to 42°F. for about 6 weeks, and then hatched out in three days at a temperature of 75°F. It would be convenient, if it were possible, to send living sporozoites by post, for injection by means of a syringe; unfortunately all attempts to preserve sporozoites in the various citrate, salt and glycerine fluids which have been tested have proved unsuccessful, though they will live in mosquitoes for more than 2 days after the insects have died [but see Bruce MAYNE, below, p. 852].

Mr. L. M. CLARKSON, Chief Sanitary Engineer of the Georgia State Board of Health, emphasized the importance of drainage in malaria control. The great difficulty is lack of funds. Though money is scarce, labour is plentiful. Twenty-five counties in Georgia are employing convicts, and, in 1931, about 135 miles of ditches and canals were dug, and 10,000 acres were drained. " We adopt as our slogan ' A Ditch in time saves Quinine ' . . . Dynamite drainage may be mentioned. . . . One project involves about 7 or 8 miles of canal constructed by the use of parallel rows of dynamite. . . . Work of this nature is very spectacular and is very valuable in creating publicity and interest in malaria drainage. We usually have the newspapers take photographs of the dynamite explosions."

Mr. H. R. FULLERTON and Dr. E. L. BISHOP dealt with the housing of tenant farmers on large estates. The Tennessee Department of Public Health has issued a bulletin giving plans of suitable and cheap houses and also a plan of the suggested grouping of houses into small communities. *W. F.*

WAGNER-JAUREGG. Inwieweit besteht eine Gefährdung der Umgebung durch die therapeutische Malaria? [**How far is Therapeutic Malaria a Danger to the Neighbourhood?**]—*Wien. Klin. Woch.* 1933. June 9. Vol. 46. No. 23. pp. 705–706.

The author deals with a communication by Dr. E. MARTINI on this subject [*ante*, p. 73].

He shows that from 1916 to 1920 large numbers of soldiers, heavily infected with malaria, returned to Vienna from the Italian, Russian and Balkan fronts. At the time medical circles in Vienna were perturbed by this as they thought malaria might become endemic in Vienna, but their fears proved groundless. Latterly there have been only 1 to 8 cases in the year, and these mainly amongst persons from foreign parts. Further, since 1919 in his clinic 3,000 persons have been treated with malaria and in other clinics another 3,000, and not a single medical officer, nurse, uninoculated or other person in the neighbourhood of these clinics has contracted malaria. He notes that 2 unintentional cases of malaria have been recorded from Sweden and 2 from Italy, the latter not being free from fallacy. He points out that MARTINI sees a special danger of spread of malaria in the relapse, but Wagner-Jauregg has never seen a relapse in Vienna in cases inoculated from infected persons and fully treated with quinine; relapses appear to occur with high frequency in cases inoculated by allowing infected mosquitoes to bite them; the latter system is not employed in Vienna and the author is unable to understand why MARTINI has a preference for it. The author concludes that MARTINI has exaggerated the danger to the neighbourhood from therapeutic malaria.

E. D. W. Greig.

WICHELS & MAASS. Die Uebertragbarkeit der Impfmalaria durch Anopheles. **[Transmission of Inoculation Malaria by Anopheles.]**—*Klin. Woch.* 1933. May 13. Vol. 12. No. 19. pp. 744–745.

A case of tertian malaria occurring in October in the wife of an employee at a psychiatric clinic at Greifswald in north Germany. Treatment by inoculation of malaria is practised in the building and it is believed that the infection was conveyed to the employee by anopheles, which are numerous at Greifswald This is the first case of the kind to be reported in Germany. [For a similar occurrence in Sweden see this *Bulletin*, Vol. 23, p. 828, KLING. Nothing is said of the strain of *P. vivax* employed, how long it has been in use, and whether gametocytes can be demonstrated or not.] *A. G. B.*

SERGENT (Edmond). Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1932. **[Report of the Algerian Pasteur Institute for 1932.]**—*Arch. Inst. Pasteur d'Algérie.* 1933. June. Vol. 11. No. 2. pp. 219–251. [68 refs.]

This report contains several interesting *ex-cathedra* opinions. Henry's reaction is of comparatively little value. Oiling is to be preferred to Paris green in Algeria. Gambusia is of great value in Algeria.

The splenic index is superior to Henry's reaction as a measure of the amount of malaria in the country. Henry's reaction is positive in trypanosomiasis and leishmaniasis, as well as in malaria ; in advanced malaria, the flocculation is produced by distilled water without the addition of Henry's antigens ; its results do not always accord with the microscopical findings ; in certain long-recovered cases of malaria, with neither parasites in their blood, nor enlarged spleens, the reaction is positive, though there is no reason to regard them as carriers of infection. [See also TZECHNOWITZER and others, below, p. 892.]

Paris green has the disadvantages of not killing the nymphs and of requiring more frequent application than oil ; sometimes the necessary sand, or other diluent, cannot be found near the place of application and on these grounds oiling is to be preferred in Algeria, unless there is a pronounced difference in the cost.

The Institut Pasteur introduced, in 1926, *Gambusia holbrooki*, the little larvivorous fish of Texas. It has become acclimatized, it has increased enormously and, where it flourishes, it destroys the larvae ; for example, in a reservoir recently constructed near Algiers it has kept mosquitoes in check throughout the hot season and rendered other anti-larval methods unnecessary. *W. F.*

THOMSON (J. Gordon). **Immunity in Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 483–503. With 2 charts & 14 coloured figs. on 1 plate. [64 refs.]

The lecturer's main thesis was that phagocytosis is an important factor in recovery from malaria, and that the clumping of cells seen in subtertian infections may be due to a sensitizing antibody.

The lecturer began with a comprehensive review of the work which has been done in this important field. DANIELS stated in 1901 that fever was common in native African children, but very rare in adults. The splenic index rose rapidly during early childhood, reached a maximum at the third year, remained high until the tenth year, and then declined rapidly. During this prolonged process of immunization in

African children, blackwater is practically unknown—a phenomenon which the lecturer suggested might be due to a racial immunity built up during generations of residence in hyperendemic areas. Europeans also acquire a partial immunity, associated as a rule with the persistence of a few parasites in the blood, but unaccompanied by much fever. " The longer these people reside in such areas, the more prone are they to develop blackwater fever. . . . Acquired immunity in Europeans, at least, is far from satisfactory and may be highly dangerous." Though adult natives in hyperendemic areas show few clinical symptoms and very little anaemia, Europeans who have developed a partial immunity are usually debilitated and anaemic, and constantly run the risk of blackwater. [See League of Nations report, below, p. 837].

CHRISTOPHERS (1924) found that, in a hyperendemic area in India, during the age period 0–2 years, the parasite rate was 100 per cent., the spleen rate was 88 per cent., and fever was continuous (" acute infestation "). During the age period 3–5 years, the parasite rate fell, there was less fever, and the spleen rate rose to 92 (" immune infestation "). From 6 to 10 years the parasites and fever became still less, and the spleen rate sank to 74. Adults were practically immune, there were few signs of malaria, fever was rare, the spleen rate was 11, and there were scanty parasites in the blood. The lecturer in summing up the evidence stated that the process of acquiring tolerance required continuous exposure to infection for about 15 years, and that the resulting immunity to superinfection in adults was associated with a latent infection. The length of time taken to attain this immunity might be due to the existence of many different strains of parasites in the locality, with each of which the individual must be " salted." [An immunity resulting from a persisting infection is known as *premunition*. Dr. C. M. WENYON explains in a footnote that, " the word ' premunition ' was introduced by Sergent, Parrot, and Donatien (1925) . . . to indicate an immunity or resistance to infection as a result of a still existing latent infection . . . a resistance to further inoculation of a host which is already tolerating the presence of a small number of parasites which are often demonstrable only by the inoculation of large quantities of blood into susceptible animals, as so frequently occurs in piroplasmosis."]

The lecturer then reviewed the work of JAMES (see this *Bulletin*, Vol. 28, p 566) and others which has shown that an experimental acquired immunity to an inoculated strain of parasites can be developed in man, but that it does not protect against other strains of the same species. Some people, although they have never had malaria, cannot be infected experimentally, and it is clearly proved that certain individuals possess a natural or inherited immunity which is not always permanent. Attempts have been made to demonstrate the presence of immune bodies in the blood serum of malaria patients, but the difficulty of obtaining a pure antigen has rendered the results inconclusive.

The study of immunity in bird malaria has afforded valuable information. After the initial attack is over, a period of latency supervenes during which the blood contains sufficient parasites to produce infection if it is inoculated into healthy birds, but too few to be detected by microscopical examination. During this period, which may last two years or more, the bird is in a state of premunition, and is immune to further inoculations with the infecting strain, but when it has recovered completely and all parasites have disappeared, it is immune no longer.

The serum of birds in the latent stage has no protective action, and attempts to demonstrate antibodies have been unsuccessful; but CANNON and TALIAFERRO (this *Bulletin*, Vol. 28, p. 494) have shown that the immunity is primarily cellular and consists of a stimulation of phagocytic power of cells of the reticulo-endothelial system, particularly in the spleen and liver. The extent of this stimulation is such that if a bird in the latent stage be re-inoculated, all parasites are cleared out of the peripheral blood within 24 to 48 hours. TALIAFERRO (*ante*, p. 86) found a similar mechanism in Panamanian monkeys infected with the quartan parasite (*P. brazilianum*), where the acute infection is followed by a high degree of immunity during which the parasites continue to multiply, but are controlled by increased phagocytic activity.

With regard to immunity in human malaria, the lecturer showed pictures (an excellent coloured plate is reproduced) demonstrating the phagocytosis of undegenerated malaria parasites. In three human cases, the predominant feature was the activity of the polymorphonuclears; in another, the large mononuclears were digesting schizonts in large numbers. Films from the livers and spleens of other cases showed that the macrophages had engulfed the parasites. The reason why so few observers have seen parasites undergoing phagocytosis can probably be set down to faulty technique. It is very difficult to demonstrate, in sections, parasites within macrophages or Küpffer's cells, because they are obscured by masses of pigment; but in well-stained smears prepared from the liver and spleen the process is obvious. The tendency of blood cells infected with *P. falciparum* to clump together and adhere to the sides of blood vessels may be evidence of some antibody which sensitizes and stimulates phagocytic activity.

The discussion which followed Professor Thomson's lecture was opened by Major H. C. BROWN who spoke of his observations on the erythrocytes in bird malaria (see below, p. 830) and their bearing on the problem of immunity. Dr. G. M FINDLAY, stated that he had confirmed the work of TALIAFERRO on bird malaria as to the intense phagocytic activity of the reticulo-endothelial system at the time when the parasites were disappearing from the blood. When parasites were inoculated into immune birds they disappeared within 48 hours, but if the R. E. system had been blocked beforehand, by an injection of trypan blue or Indian ink, they remained in the blood for 4 or 5 days. There was also some evidence of an immune body in the serum of immune birds. Col. S. P. JAMES said that Professor Thomson's specimens were characteristic of very acute cases; did they come from a person who was becoming immune, or from one on the point of death? Why should they be regarded as evidence that phagocytosis is the main factor in immunity? He also questioned if studies in bird malaria were a good guide to studies of immunity in human malaria. Professor W. YORKE did not think it right to regard phagocytosis as the essential process of tolerance in malaria. [*W. F.*

DE LANGEN (C. D.). **Polynuclear Leucocytes in the Phagocytosis of Malaria Parasites.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 523–524.

The formula is given of an intra-vital stain which enabled the author to detect the phagocytosis of malaria parasites by young polynuclear cells in two patients with severe malaria, one of whom died.

It is difficult to decide whether this is a usual process, or if it occurs only in exceptional cases when the blood is flooded with merozoites. "The pigment seen in our neutrophilic leucocytes gives more the impression of being phagocytosed and crumpled up merozoites . . . up to the present it must be considered as an exceptional phenomenon." The author's combined staining method, originally adopted by him for the study of reticulocytes, is as follows :—

" A drop of 1 per cent. brilliant cresyl blue, of which the pH has been adjusted to be as nearly neutral as possible, is placed on the finger-tip of the patient, which has been cleaned and rendered grease-free with ether. The prick is now made through the drop of stain, so that the resulting blood may mix at once with the staining solution. The exuding drop of blood is mixed thoroughly with the drop of stain by means of the stilette used to make the puncture. This preliminary staining lasts two minutes. Then the mixture of blood and stain is spread out on an ordinary glass slide in the usual way, dried, fixed with methyl-alcohol and counter-stained with Giemsa's stain. By this method excellent pictures are obtained."

W. F.

BROWN (H. C.). **Preliminary Observations on Electric Charge of the Erythrocytes in Bird Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 515–522.

Changes in the electrical charges of erythrocytes in bird malaria furnish evidence of the formation of immune bodies.

The author and Dr. J. C. BROOM have already studied the electrical conditions associated with the phagocytosis of bacteria. They have shown that typhoid bacilli normally carry a negative charge, and that in the presence of a specific immune serum this negative charge is reduced and the bacilli enter the phagocytes. They found that if the reduction in the negative charge of the bacilli were prevented by the addition of a polyvalent anion, such as potassium ferrocyanide, phagocytosis did not take place.

The author has now investigated the electric charge of the erythrocytes in bird malaria in the same way. A dilute suspension of the blood of the bird under investigation was placed in a cataphoresis cell, a pressure of 200 volts applied, and the time which the erythrocytes took to cross the field was observed. (Highly charged particles migrate more quickly than those with lower charges.) Daily observations upon the electric charge of the erythrocytes of infected birds, together with their parasite rates, were undertaken in 20 infected and 21 normal birds, and it was found that whenever there was a fall in the number of malaria parasites, the corpuscles migrated more slowly ; that is to say, their negative charge was reduced. The author and Dr. Broom have already shown that the charge of erythrocytes is reduced in the presence of immune serum, and it is suggested that the reduction of charge which occurs in bird malaria is also due to the presence of immune substances. All the birds were killed in order to estimate the degree of phagocytosis in the internal organs, and Dr. G. M. FINDLAY, in the discussion following Professor J. G. THOMSON'S paper (see above, p. 827) stated that when the parasites were very numerous and the electrical charge of the red cells was high, the spleen remained small, and the percentage of large mononuclear cells containing phagocytosed parasites was only 2 or 3 ; but with the fall in the number of parasites in the peripheral blood and the reduction in the charge of the red cells (that is to say, as the bird recovered from the attack), the spleen became soft and enlarged, and the percentage of mononuclear cells with engulfed parasites rose to 14 or 15. This, Dr. FINDLAY suggested, was evidence of some immune substance. There appears to be no difference in the electric charge of cells containing parasites and the healthy cells in an infected bird. *W. F.*

MULLIGAN (H. W.) & SINTON (J. A.). **Studies in Immunity in Malaria. Part II. Superinfection with Various Strains of Monkey Malarial Parasites.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 529–568. [3 pages of refs.]

Infection with a strain of monkey malaria immunizes against the same strain.

The authors review work which has been done on super-infection and immunity in bird-malaria, human malaria and monkey malaria, and give references to about 80 publications. They then describe their own experiments with monkeys, from which they conclude that immunity to the parasites of simian malaria appears to be very similar to that found in the case of the human plasmodial infections. Several strains of *Plasmodium knowlesi,* with different immunological characters, were isolated from the Malayan monkey *Silenus irus.* An infection with one strain of *P. knowlesi* or with one strain of *P. inui* var. *cynomolgi* immunized against the same strain, but not against other strains of the same species. There was, however, some evidence to suggest that a slight degree of common immunity existed between strains of the same species of parasites, for an infection with one strain of *P. knowlesi* appeared to confer some tolerance to the effects of superinfection with a different strain of the same parasite ; there was an increased tendency to spontaneous recovery and a lessened tendency to relapse. This tolerance was possibly non-specific and due to a general stimulation of the reticulo-endothelial system by such malarial infections.

No cross-immunity between different species was demonstrated.

W. F.

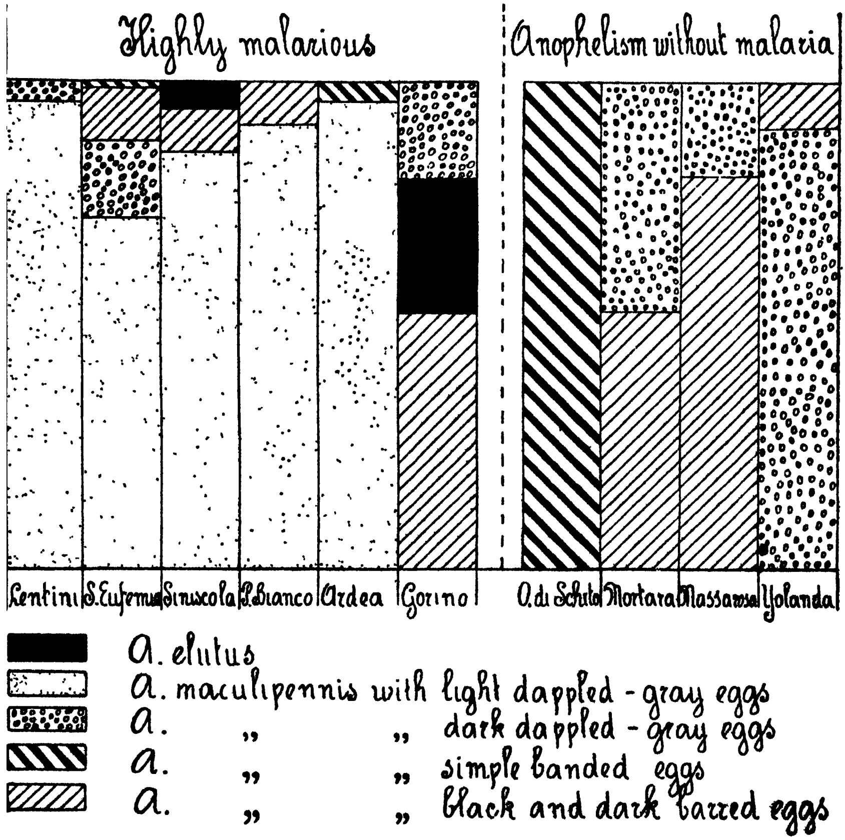
VAN THIEL (P. H.). **Investigations on the Range and Differentiation of *Anopheles maculipennis* Races and their Bearing on the Existence or the Absence of Malaria in Italy.**—*Riv. di Malariologia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 281–318. With 8 graphs, 1 fig. & 2 plates. [25 refs.]

An attempt to correlate the races *A. maculipennis atroparvus* van Thiel and *A. maculipennis typicus* of the Netherlands, with Falleroni's races, *labranchiae* and *messiae,* in Italy.

The presence of anopheles without malaria in various European countries has been explained by the existence of several races within the species *A. maculipennis* Meigen. In the Netherlands, a small winged race with a large maxillary index—*A. maculipennis atroparvus* van Thiel—predominates in malarious zones, and a larger winged race with a smaller maxillary index predominates in non-malarious zones. Similarly, in Italy, a race known as *A. maculipennis labranchiae* Falleroni which breeds almost exclusively in low-lying, brackish marshes, is androphilous, frequents dwellings and predominates in malarious areas. Another race predominates in zones where there is no malaria ; this is *A. maculipennis messiae* Falleroni, a misanthropic race which breeds in fresh water and frequents stables rather than dwellings. The two races are distinguished by their eggs ; the eggs of *labranchiae* are dappled, the eggs of *messiae* are barred. The author visited Italy at the invitation of the International Health Board of the Rockefeller Foundation, and studied the question of the identity of the two Dutch races with the two Italian races. He decided that his *A. maculipennis atroparvus* was not identical with *A. maculipennis labranchiae* Falleroni, and that *A. maculatus typicus* Meigen was not identical with *A. maculatus messiae* Falleroni. The paper contains a large number of measurements and is difficult to summarize.

The Bologna school (OTTOLENGHI, BONALBERTI, BRIGHENTI) assert that the connexion between wing-length and malaria which has been established in Holland, does not obtain in Italy; for example, in malarious Gorino, the anopheles have not shorter, but longer, wings than the anophelines in non-malarious Yolanda. The author investigated this problem and decided that the malaria in Gorino was not due to the long-winged *A. maculipennis* but to the concurrence of *A. elutus*.

He slept for a night in an unscreened room over a stable at Orti di Schito, near Pompeii, where there is anophelism without malaria.



Graph illustrating the correlation between malaria and *A. maculipennis* with light dappled-gray eggs. Where only, dark dappled-gray eggs, simple banded eggs, or black and dark barred eggs are found malaria is absent. The malaria at Gorino is explained by the presence of *A. elutus*.

[Reproduced from the *Rivista di Malariologia*.]

Hundreds of anopheles filled with blood were found in the stable, but in the bedroom there were only two anopheles—unfed—and a few culicines. Here the anopheles belong to the zoophilic *messiae* race which lays banded eggs, and there are many cattle. " If the cattle should disappear," says the author, " the chance for malaria to break out comes back." However, he does not believe, with ROUBAUD, that predominance of one kind of host causes prominence of one race of anopheles ; there must be a change in the condition of the breeding places as well, *e.g.*, an alteration in the salinity of the water.

He has " been able to confirm completely the observation of the Italian authors that there exists a strong correlation between the presence of malaria and the presence of mosquitoes with light dappled-grey eggs."

He is convinced that the differences between *maculipennis* populations in different parts of the Netherlands are genetic differences, and are not modifications caused by different circumstances in the breeding places. The same is probably true in Italy, but it has not yet been established.

[It is interesting to note, as a contrast, that in parts of Italy malaria appears to have been suppressed by keeping salt-water out of the breeding places, while in other countries, such as Jamaica (see WASHBURN, above) it has been suppressed by letting it in. DE BUCK, TORREN and SWELLENGREBEL state that the pattern of the dorsal surface of the eggs of their short-winged, malaria-carrying, race resembles the pattern on the eggs of the Italian variety *labranchiae*, and the pattern on the long-wing's eggs resembles that of *messiae*. See this *Bulletin*, ROUBAUD, Vol. 19, p. 476 ; Vol. 29, pp. 140 & 831. DE BUCK, SCHOUTE & SWELLENGREBEL, Vol. 27, p. 910 ; Vol. 29, p. 345; Vol. 30, p. 70. HACKETT, MARTINI & MISSIROLI, Vol. 28, p. 569; Vol. 29, pp. 480 & 832 ; below ; TRENSZ, Vol. 29, p. 141. VAN THIEL, Vol. 29, p. 142.] *W. F.*

MISSIROLI (A.), HACKETT (L. W.) & MARTINI (E.). Le razze di *Anopheles maculipennis* e la loro importanza nella distribuzione della malaria in alcune regioni d'Europa. (**Study of the Races of** " *A. maculipennis*.")—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 1–56. With 1 plate, 12 figs. & 6 graphs. [14 refs.] English summary p. 258.

There are at least four varieties of *A. maculipennis*. " Three of these four are genotypes and differ almost as much from one another as they do from *A. elutus*, which may, therefore, be considered as only a well-marked race of *A. maculipennis*." These races have been localized in Italy and Germany. Each race has been linked with the hydrological conditions of its larval habitat and with the incidence of malaria. All the races of *A. maculipennis* are associated more frequently with animals than with man, but individuals of *A. maculipennis elutus* and *A. maculipennis labranchiae* are found in close association with man, and intense endemic malaria is found where they are abundant. Other varieties, especially *A. maculipennis maculipennis* and *A. maculipennis messeae* are attracted almost exclusively to stables and are not good carriers in the natural transmission of malaria. When they are present in excessive numbers, and stabled animals are scarce, they are able to maintain endemic or epidemic malaria. Where such conditions exist (Mantua, Medemblick, Emden) benign tertian fever of low intensity may occur, and the importation of a large number of gametocyte carriers may provoke a temporary recrudescence. [See VAN THIEL, above, p. 831.] *W. F.*

KLIGLER (I. J.) & MER (G.). **Studies on Malaria in an Uncontrolled Hyperendemic Area. X.—Behaviour of *A. elutus* in Relation to Housing and Malaria.**—*Riv. di Malariologia.* 1932. Sept.–Oct. Vol. 11. No. 5. pp. 553–583. With 6 charts & 2 figs.

The authors find no evidence of " homing instinct " or of zoophilic races in *A. elutus.*

This paper describes the authors' further researches at Melaha and Yessod near the Huleh marshes. Melaha is a Beduin camp, and Yessod is a settled Jewish village. The principal aims of the investigation were to determine whether *A. elutus* was a house-haunter and night-biter; whether certain types of houses were more attractive than others to *A. elutus*; whether these mosquitoes returned to the houses where they had fed (" Homing and Hospice return instinct "); and if some strains of *A. elutus* fed on animals and others fed on man. They concluded that :—

(1) *A. elutus* is a house-haunter, but feeds on people and animals sleeping out of doors. (2) Absence of light, ventilation and smoke offer attractive conditions for the concentration of *A. elutus* in houses. (3) The mosquito seldom returns to the house where it has fed. There is an active interchange; only specimens having no need of oviposition remain in houses. A hut made of matting was erected: it was dismantled after 8 days and the mosquitoes counted. When it was left up for two or three weeks the number was no greater. When it was left up for only one day the number was only 50 per cent. less, and one of the mosquitoes was infected. These results testify to a rapid interchange. (4) With reference to the existence of zoophilous and androphilous races of *A. elutus.* The mosquitoes emerging in the spring and autumn are larger than those in the summer, but animal preference was not demonstrated and the authors ascribe the larger size to a slower rate of emergence in the colder seasons of the year. It is possible that smaller mosquitoes feed more easily on thin skinned man than on thick skinned animals. " It is conceivable that greater ease in obtaining food from one rather than another animal may ultimately lead to the selection of a strain having a certain preference; in that case, it seems to us that a combination of factors, such as temperature of the breeding places, the number of cattle and conditions of stabling, and finally dwellings and customs of the inhabitants unsuitable for the insects all operating in the same direction, will be required to effect the desired change." [See this *Bulletin,* above, p. 468.] *W. F.*

HODGKIN (E. P.) & RAJAMONEY (P. D.). **I.** *Anopheles hyrcanus* **Pallas as a Malaria Carrier in Malaya** [HODGKIN]. **II. A Descriptive and Biological Note on the Malayan Varieties of** *Anopheles hyrcanus* **Pallas** [HODGKIN & RAJAMONEY].—*Bull. Inst. Med. Res. Federated Malay States.* 1932. No. 1. 18 pp. With 2 plates & 1 folding map. [31 refs.]

i. Eighty-three cases of malaria were reported in Kuala Lumpur during 1930, among the population of 133,000. Forty-seven of these cases occurred in low-lying land near a river, where there were several large, weed-grown ponds, in which the most numerous anopheline breeder was *A hyrcanus* The dissection of 300 adults of this species, taken by means of a human bait mosquito-trap, showed an infection rate of 6 per cent —4 per cent in the gut and 2 per cent in the glands. Five of the midgut infections were due to *P vivax*, and six to *P falciparum* Both varieties of *A hyrcanus*, *viz*, *sinensis* and *nigerrimus*, acted as carriers

ii There are some six or eight varieties of *A hyrcanus*, two of which namely *sinensis* and *nigerrimus*, are found in the Malay States Clear diagrams are given which illustrate the distinctive markings *A hyrcanus* is an open swamp breeder and readily attacks man *W F*

STRICKLAND (C) & CHOWDHURY (K L) **The Sporozoite Rate of Anophelines caught Wild in the Terai, 1931. With a Note on Some Correlations in the Infectivity of** *A funestus*, **by** H P CHAUDHURI —*Indian Jl Med Res* 1933 July Vol 21 No 1 pp 67–89 With 1 chart & 1 map

Of *A funestus* (*minimus* and *listoni*) caught in tea-garden coolie-lines, 4 7 per cent were infected

The Sergents' method for determining the malarial infectivity of mosquitoes is much quicker than the old method of dissecting out the salivary glands and gut This newer method was employed in the examination of 22 000 female anophelines taken in the Darjeeling Terai The following were the prevalent species *A funestus* 7 912, *A vagus* 10 452, *A subpictus* 704, *A fuliginosus* 1 417, *A culicifacies* 1,138 *A philippinensis* 29 The following were found infected *A funestus* 308, *A vagus* 2, *A philippinensis* 1 The proportion found infected in different shelters was as follows —Tea garden coolie-houses, 4 7 per cent, village coolie houses 3 0 per cent, village cattle-sheds, 2 5 per cent The enumeration of anopheles in houses and cattle-sheds demonstrated the relative zoophilism of *A fuliginosus* and the corresponding androphilism of *A funestus* and *A vagus* The infectivity rate was higher in the evening than in the morning, and the authors suggest that this was due to the return of the older mosquitoes to shelter after oviposition during the day There were more anopheles in the coolie-lines than in the houses of the superior staff, yet blackwater fever was more common in the latter The authors ascribe this difference to the presence of smoke in the coolie-lines, which they suggest may kill off the anopheles before they become infective *W F*

FAIRLEY (N Hamilton) **A Case of Malaria due to** *Plasmodium ovale* **Stephens 1922.**—*Brit Med Jl* 1933 July 15 pp 101–102

STEPHENS reported in 1922 a new malaria parasite in a man coming from East Africa and, because of its shape, he called it *Plasmodium ovale*. The parasite resembled *P malariae*, but the infected corpuscles were oval in shape and were stippled with Schuffner s dots In 1927, STEPHENS and OWEN described a case from Nigeria, in 1930, YORKE and OWEN described another from the same place, and here the author reports a case in a man of 28 who contracted the infection during a tour of 143 days in various parts of West Africa The species of parasite was suspected on clinical grounds when the laboratory reported the finding of atypical quartan parasites in a patient with a tertian fever. Further examination proved the suspicion correct, for the parasites showed the morphology of *P. ovale*; the red cells were pale, fragile and characteristically oval, and they were heavily stippled with Schüffner's dots. This stippling was not present in films stained with Leishman, but was demonstrated by staining overnight with Giemsa. The urine showed excess of bile salts and urobilin, with a trace of bile pigment, and a positive indirect van den Bergh reaction of 2·5 units. After five days treatment this fell to the normal level of 0·2 units and, with recovery, the reticulocytes increased. They reached a maximum of 6·3 per cent. on the eighth day of treatment, and declined to the normal level of 1 per cent. a few days later. [See this *Bulletin*, Vol. 20, p. 296; Vol. 28, p. 606; Vol. 30, p. 74.]

W. F.

INDIA. **Annual Report of the Public Health Commissioner with the Government of India for 1931.** Vol. II. pp. iv+187. 1933. Delhi. [Rs. 1-10 or 2s. 9d.] [**Malaria** pp. 22–25.]

" An attempt was made to prove or disprove the existence of missed malaria, *i.e.*, cases in which the parasite could not be found and which were diagnosed under some other heading. With this object in view, the hospital record cards of five British infantry units were examined and the cards of all cases who were admitted for any febrile condition which was followed later in the year by an attack of malaria were scrutinized. The units selected were stationed in Peshawar, Sialkot, Ferozepore, Amritsar, Lucknow, Mhow and their associated hill stations. The total strength is not known accurately but must have been over 4,000, out of which number 1,951 individuals provided 2,688 admissions to hospital. Thus approximately half the men were not admitted to hospital during the year. Among the total of 2,688 admissions there were 38 admissions for febrile conditions followed later in the year by an attack of malaria. From the description and after history of the cases they could be divided into ' possible ' and ' probable ' missed malaria. The results with the diagnosis in the primary admission were as follows :—

Primary diagnosis	Possible malaria	Probable malaria
Sandfly fever	32	20
Constipation	3	1
Myalgia	2	2
Heat exhaustion	1	1
Total	38 (1·4 per cent.)	24 (0·9 per cent.)

If these figures can be accepted as a guide the amount of missed malaria cannot exceed 1 per cent. of the total admissions which must be considered satisfactory."

W. F.

VAN DER HORST (G. A.) & VERHAART (W. J. C.). De veranderingen in de hersenen bij malaria. **[Cerebral Changes in Malaria.]**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. June 20. Vol. 73. No. 13. pp. 797–812. With 6 figs. on 2 plates. [50 refs.]

Clinical and pathological conditions described in the literature and referable to the nervous system as a result of malarial infection are very diverse and numerous. The malarial " granulomata " of DÜRCK are composed of small glial cell aggregations with a perivascular arrangement. Out of 21 cases examined by the authors 8 showed focal lesions of granulomatous character. They consisted of perivascular necrosis surrounded by a greater or smaller number of microglia cells around which a haemorrhage or a zone of tissue rarefaction was evident. This is construed as a manifestation of a phagocytic process. All points considered, it is difficult to establish a histological diagnosis of cerebral malaria. It is certain that the finding of some perivascular areas, punctate haemorrhages and diffuse microglial proliferation does not explain the cause of death. Still more generally it may be said that a pure malarial encephalopathy is of rare occurrence. Only once out of the 21 cases examined could it be established and in the remaining cases the disease picture was complicated with cachexia, severe anaemia, jaundice or other symptom so that the cerebral condition was not the prominent affection but rather an agonal state. The authors could not diagnose anything resembling the so-called coma of malaria and consider that a general toxaemia plays the chief part in the production of that condition. *W. F. Harvey.*

QUARTERLY BULLETIN OF THE HEALTH ORGANISATION OF THE LEAGUE OF NATIONS. Geneva. 1933. June. Vol. 2. No. 2. pp. 181–285. With 8 figs. & 5 graphs. [6 pages of refs.]—**The Therapeutics of Malaria. Principles of Treatment based on the Results of Controlled Experiments. Third General Report of the Malaria Commission.**

The later one begins treatment, except in very severe cases, the better will be the results. Quinine in curative doses should not be given for longer than 7 days. Plasmoquine should not be used in the treatment of the primary attack, or given in combination with other drugs.

The Commission entrusted the task of preparing a report on the therapeutics of malaria to a committee consisting of Colonel JAMES, Professors C. D. DE LANGEN, P. MÜHLENS, B. NOCHT, G. PITTALUGA, and Ed. SERGENT. A draft report prepared by Colonel JAMES, was adopted after discussion and amendment. It deals with the subject " from the point of view of persons who are in a position to obtain expert medical advice and efficient care rather than from that of the mass of the population of malarious countries. The report does not contain information on plans for treating outpatients who attend at hospitals and dispensaries."

It was decided at the outset that no standard form of treatment could be recommended, for it has been proved that, although such a scheme may suffice for curing most cases of malaria in the country where the routine was devised, it may be quite ineffective in another part of the world. It seems probable that the therapeutics of malaria, like every other aspect of the disease, is much more a local and individual problem than has hitherto been thought. The Commission is of opinion that, at the present time, it is more important to devise a standard method for testing the therapeutic efficiency of drugs in different countries than to set up a standard treatment. All clinical tests of the power of drugs to prevent relapses which were made prior to 1931 were misleading because of lack of knowledge of the important type of recurrence in benign tertian which occurs about eight months after the primary attack. For example, the conclusion that plasmoquine was a true causal prophylactic was upset by the occurrence of malaria among some of the volunteers seven or eight months later. Again, it was believed, until recently, that relapse was almost inevitable in benign tertian, but now it is known that only about 50 per cent. of infections with *P. vivax* relapse after quinine treatment, and that, in several countries, some of the benign tertian cases are caused by *P. ovale*, an infection from which complete recovery occurs so quickly that specific treatment is hardly necessary.

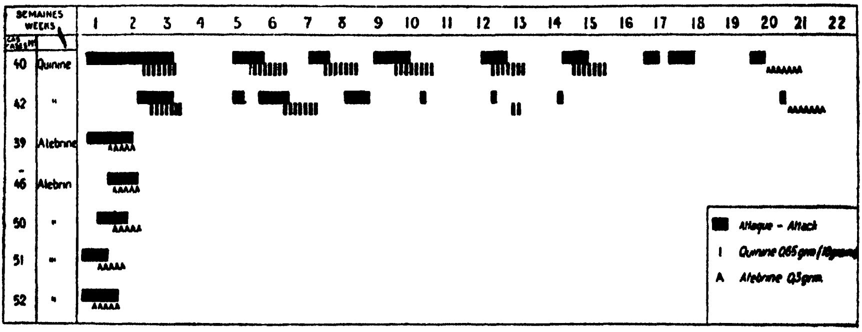
As regards the problem of true causal prophylaxis, the final aim of chemotherapeutic research is to find a drug which will destroy the parasites injected by the mosquito before they have entered the red cells. No one has repeated SCHAUDINN'S observations, in which he described the entry of the sporozoites into red blood cells. Sporozoites are essentially tissue cells. Perhaps some of them do not pass at once into the blood stream, but enter subcutaneous connective tissue cells and remain quiescent there until these cells break down some months later ; or perhaps not all of those which enter the blood stream proceed at once to attach themselves to blood corpuscles, but some enter the reticulo-endothelial cells and there undergo development (like the avian haemoproteus) producing merozoites which escape from the cell and enter the blood cells. On these hypotheses, it has been suggested that a true causal prophylactic may be concerned, not only with the destruction of sporozoites in the blood stream but also within tissue cells. Repeated trials with quinine have shown that it has no causal prophylactic action ; that is to say, it does not destroy the organism injected by mosquitoes before it continues its life cycle in the human host. As regards plasmoquine, more than fifty experimental trials have been made in England alone, and, as a result, it appears that the doses which it is necessary to use for the purpose are too large for safety. If 0·08 grams a day are given, beginning on the day before experimental infection and continuing for 5 days thereafter—reducing if necessary to 0·06 gm. from the fourth day—plasmoquine acts as a true prophylactic. In doses of 0·06 gm. over the same period, or of 0·04 given for three days longer, it will prevent the onset of an attack within the usual incubation period, but it will not always prevent a latent infection which may become manifest in 7 or 8 months. This is true for persons who are infected on only one day. When volunteers were exposed to the bites of mosquitoes two or three times a week over a period of 4 or 5 weeks, as they might be in a malarious country, 50 per cent. of them developed malaria though they took 0·04 gm. of plasmoquine throughout the period of exposure. It appears that it would be effective only if it were taken continuously in doses of at least 0·06 daily, and this dose is too large to be taken for more than a few days with safety. Preference should be given to atebrin ; 0·3 grams of atebrin daily has the same effect as 0·06 of plasmoquine, and is quite safe. Seven persons who were given atebrin in these doses, on the day before infection and for 5 to 8 days afterwards, were protected from ordinary attacks, but some of them had latent infections which became manifest 7 or 8 months later. The preparation Fourneau 710 appeared to act in the same way as plasmoquine, but to be even more toxic.

Clinical prophylaxis differs from causal prophylaxis, because, in the former, no attempt is made to prevent infection ; its object is to prevent the parasites from causing fever and illness. The Commission recommends for this purpose a daily dose of 0·4 gm. (six grains) of quinine throughout the malaria season and for several months afterwards. Children from 4 to 12 are given half the adult dose, and babies receive 5 centigrams for each year of age, in chocolate-coated pills. Quinine does not begin to act until fever is on the point of occurring, that is, not until parasites can be found in the blood, and, it the dose is omitted, an attack is likely to occur. The wide experience of the Italian school shows that clinical prophylaxis is a valuable measure in endemic areas, particularly in those where medical attention is difficult to obtain.

Atebrin, in daily doses of 0·1 gm., appears even more effective than quinine as a clinical prophylactic but, as with quinine, the suppressed fever may flare up when it is stopped. A patient at Horton who continued the doses for 15 days after infection had an attack 3 months later. It would be premature to recommend atebrin for clinical prophylaxis until it is known to be harmless when continued over long periods.

As regards the treatment of the attack ; " we wish to . . . . correct the common view that the earlier one begins specific treatment the more successful will be the results. Except in very severe cases . . . the truth is just the reverse. To give large doses of quinine indiscriminately to all cases of malaria is a grave error." Persons who pass through a few attacks acquire a certain degree of immunity, and an endeavour should be made to prescribe the doses of quinine which are just sufficient to be effective at the particular stage of the disease without interfering with the patient's defensive mechanism (but, see Gordon THOMSON, above, p. 827). Relapses are always much more easily controlled than are primary attacks, because the patient already possesses some acquired defensive power. The risk of pernicious symptoms in malignant tertian is greatest in the primary attack and early recrudescences ; in relapses, the patient is protected by the immunity he has acquired. [The advantage of delayed treatment will be disputed in those tropical countries where infection with malignant tertian parasites is not a single event, but an almost daily occurrence.] In all cases with severe vomiting or cerebral symptoms, a dose of the specific remedy should be given intravenously. Quinine bihydrochloride 0·6 gm. (9 grains) or 0·3 gm. of atebrin, dissolved in 5 cc. of normal saline, are suitable doses. The Commission strongly disapproves the practice of treating ordinary cases of malaria by intravenous or intramuscular injections of quinine.

The treatment of the attack and the attempt to prevent relapses should be kept separate; "courses of treatment with curative doses should not exceed seven days ", long treatments impede immunity. The attack can be controlled by seven days' treatment, and the quinine should then be stopped, until a recrudescence occurs and parasites can be found, when another seven days' treatment should be given. In benign tertian malaria, if there is a second recrudescence three or four paroxysms should be allowed to occur unchecked before resuming treatment in order that immunity may be acquired. Later recrudescences may be controlled by smaller doses. An alternative plan, which may be employed after the primary attack has been controlled is the adoption of clinical prophylaxis—*i.e.*, a daily dose of 0·3 to 0·4 gm. of quinine daily, throughout the period of residence in a malarious district. As regards quinine, large doses are not more effective than moderate doses; "there is a general consensus of opinion that, to obtain the optimum action of specific antimalarial remedies, the co-operation of the host's defensive mechanism is necessary, and that this mechanism may be greatly impaired by giving the specific drugs in too large doses, or during too long a period."



Graph showing the superiority of atebrin over quinine for the cure of primary attacks of malignant tertian malaria. All cases were experimentally infected with the Rome II strain by the bites of the same infected mosquitoes on about the same dates

[Reproduced from the *Quarterly Bulletin of the Health Organisation, League of Nations*]

The treatment recommended for subtertian malaria is not the same as that recommended for benign tertian; in benign tertian, quinine is as useful as atebrin, but in subtertian, atebrin is definitely superior, as is shown by the diagram (reproduced) of the results of treatment with atebrin and quinine respectively. The first recrudescence in subtertian occurs within 15 days of the primary attack, and each recrudescence is milder than the one before. Each recrudescence should be treated in the same way as the primary attack, by a 5 to 7 days' course of atebrin or quinine. It is a good practice to alternate the drugs, *i.e.*, atebrin for the primary attack, quinine for the first recrudescence, atebrin for the second, and so on. Early reports to the effect that atebrin was completely effective in preventing relapses have not been confirmed by later work, but it has a more powerful action in this respect, as regards subtertian, than any other drug. It is less effective in benign tertian and does not prevent the recurrence which occurs half a year after the primary attack.

Plasmoquine, in safe doses, is not considered to have an effective action on the asexual stage—particularly of *P. falciparum*—and it should not be employed in the treatment of the primary attack; indeed, its toxic effects seem to be enhanced by fever and anaemia. There does not appear to be any advantage in giving plasmoquine with quinine or atebrin. The drugs do not form a new combination in the stomach, each exerts only its own action, and the toxicity of plasmoquine is not reduced. "Many reports are available which seem to show that better results are obtained when quinine is mixed with another drug (even if the drug is not itself a specific remedy) . . . but at the moment the proposition can only be described as being paradoxical." Reports as to the effect of plasmoquine in preventing relapses are contradictory; the Commission is unconvinced that there are fewer relapses after a course of quinine and plasmoquine, than after a course of quinine alone. As regards the use of plasmoquine to destroy crescents it " has a powerful action against them. The doses for preventing crescent-carriers from infecting mosquitoes should be given twice a week during the period when crescents are present in the peripheral blood . . . trials should now be conducted with doses up to 0·02–0·04 grammes to ascertain the minimum effective non-toxic dose." Gametocytes are found in the blood of only a small proportion of malaria patients, they are more numerous in recent cases than in chronic cases and relapses, and the old view that they were a sign of developing immunity has been reversed. They are therefore more common in children, living in malarious places, than in the relatively immune adults, and little can be accomplished in highly endemic areas without thorough treatment of the babies and children ; it is the difficulty of accomplishing this which makes most attempts at mass treatment ineffective. The number of gametocytes varies with the number of asexual parasites present in the blood about ten days before, as shown in the chart reproduced from a paper by David Thomson. The gametocytes probably arise from the asexual parasites, and as the latter decrease, with the development of immunity, so do the former.

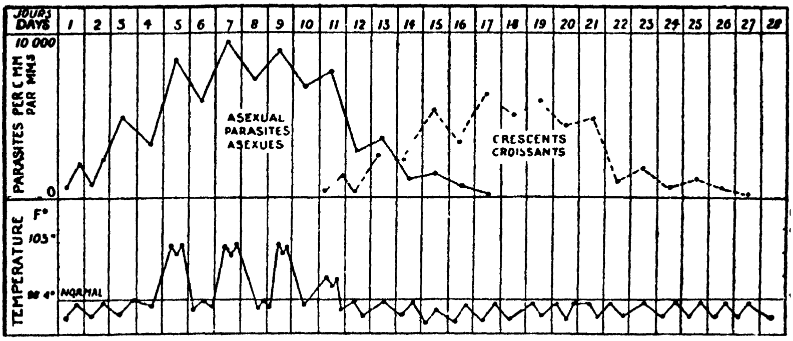


Diagram showing tertian paroxysms with corresponding outbursts of crescents ten days later.

[Reproduced from *Annals of Tropical Medicine & Parasitology.* 1911. Vol 5. p 62]

Hydroquinine is the only alkaloid which is superior to quinine as regards its tolerability and parasiticidal action. It has been successfully synthesized by Rabe, but the process is very costly. Several proprietary remedies containing hydroquinine, such as Malarcan and Tebetren, have been put on the market but, of course, they are still more expensive.

As regards Totaquina—the new standardized preparation containing all the alkaloids present in cinchona bark—this is made in two ways : type 1 is made by extracting the total alkaloids from cinchona bark, type 2 is made from the residues of quinine manufacture, with the addition of sufficient alkaloids to bring it up to the required standard.

When it is used in the ordinary therapeutic doses of 20 grains a day, type 1 gives the same good results as quinine, though 5 grains are not as effective as 5 grains of quinine. Type 2 is not so useful, and to obtain the same effect as is produced by a single dose of 5 grains of quinine, it is necessary to give 20 grains of totaquina type 2.

The therapeutic testing of drugs on the parasites of avian malaria is due to COPANARIS, the SERGENTS, GIEMSA, and MARKS ; it was established as a routine practice by ROEHL. The avian malaria infections are of two types : (1) the proteosoma type (*P. relictum*) with schizonts in the peripheral blood; (2) the halteridium type (*Haemoproteus orizivorae* of Java rice-birds) which is employed to ascertain if the drug has a gametocidal action, for, in this type, the gametocytes are present in the peripheral blood, while the schizonts are in the endothelial cells of the internal organs. Unfortunately a drug, for example Fourneau 710, which is effective in bird malaria may have little effect on the infections of man.

" The new synthetic remedies now available are still in the experimental stage . . . the time has not yet come when any of these drugs can be recommended as substitutes for . . . quinine. It is not good practice to treat attacks of malaria in the acute stage with more than one of the specific drugs . . . the Commission does not at present recommend that a system of treatment with quinine plus plasmoquine ('quino-plasmoquine,' 'plasmoquine compound,' etc.) should be adopted for reducing the incidence of relapses. . . . It is no longer considered correct to use quinine or other specific remedy in large doses for prolonged periods, nor is it any longer considered correct to hold the view that relapses happen because patients are not treated early in the primary attack or are not given sufficient quinine in that attack. . . . It might be most unwise in some malarious countries (Africa, for example) to interfere too radically with the natural process by which the indigenous inhabitants acquire immunity to the disease." What is needed in areas such as Lagos where practically everyone harbours parasites, is " not that everyone in whose blood a few parasites are found should be treated with quinine . . . but that more intensive clinical investigation should be made to ascertain precisely to what degree chronic parasitism . . . is in fact harmful to the health of the children and adults concerned, and to discover precisely at what period of life curative or preventive action may be urgently necessary or would be most helpful." *W. F*

DUBOIS (A.). Le traitement du paludisme selon la Commission de la S.D.N. **[The Treatment of Malaria according to the Commission of the League of Nations.]**—*Bruxelles-Méd.* 1933. Sept. 10. Vol. 13. No. 45. pp. 1301–1308.

The author finds that the Report is too theoretical and is opposed to practical experience.

He reviews and criticizes the salient points of this Report (see above). He cannot agree that specific treatment should await the determination of the species of the infecting parasite, the virulence of the particular strain, and the resistance of the patient. It sometimes happens that the species cannot be diagnosed from the scanty rings found in the blood ; delay is dangerous ; it is safest to assume that they are subtertian parasites and to treat the patient accordingly. It requires long observation to find out the degree of a patient's resistance to the infection ; it would be wrong to postpone treatment until this had been done. How, too, is one to discover with what particular strain a patient is infected ? Such are the counsels of the laboratory worker, rather that those of the practising physician. It is stated in the Report that quinine has no action until the parasites are sufficiently numerous to cause fever or to be demonstrable in the peripheral blood. This cannot be correct, because infection in bird or man, following the inoculation of infected blood, can be completely stopped by treatment before the parasites become abundant in the circulation.

The author vigorously opposes the doctrine of the Report, that specific treatment should not be begun as soon as a diagnosis of malaria is made. In the majority of French colonials, who take prophylactic quinine, the primary attack is not very severe ; it yields readily to prompt treatment with quinine, and frequently there is no relapse. To wait until the temperature comes down before giving quinine, or to permit several paroxysms to occur with the object of inducing immunity is to expose the patient to the risk of grave relapses and, above all, to the danger of blackwater fever. The cemeteries of Africa are full of such " *sujets d'expérience.*" The Report lays great stress on the importance of developing the patient's immunity ; but such immunity is only monovalent, and it has little solidity in places where strains of parasites are numerous and re-infections frequent. The author notes that Professor NOCHT dissociates himself more or less from the conclusions of the Report as regards delaying the administration of quinine, and he (the author) advises against an excessive temporization which might end in eternity " (*pour le patient bien entendu*)." *W. F.*

HOOPS (A. L.). **Observations on the Cure of Malaria with Atebrin.**—*Brit. Med. Jl.* 1933. June 10. pp. 993–995.

DUNCAN (David). **Atebrin in the Treatment of Malaria in Malaya.** – *Malayan Med. Jl.* 1933. June. Vol. 8. No. 2. pp. 79–90. [33 refs.]

Atebrin is cheaper and more effective than quinine.

Hoops and his colleagues in Malaya treated 253 patients with a week's course of atebrin. About half the cases were subtertian infections, and the other half were benign tertian. They were under observation from 3 to 9 months afterwards ; only 11, or 4·34 per cent. relapsed, and some of the " relapses " may have been fresh infections. The cost of a course of atebrin (15 tablets) is only 1s. 9d. as compared with 2s. 4d. which is the cost of a course (one ounce) of quinine. [See also HOOPS, *ante* p. 476.]

DUNCAN treated 400 Asiatic patients at the Singapore Naval Base. Fifteen women and 42 children were treated as outpatients (Atebrin administered to nursing mothers was excreted in the milk and found in the infants' urine) ; the remainder of the patients were male labourers who were treated in hospital. The adult dose was :— 0·1 gram of atebrin, three times a day for 6 days, together with 0·01 gram of plasmoquine, three times a day, for the first five days in subtertian infections. Children over 8 years old received the adult dose of atebrin. Treatment was equally effective when the drug was given in one daily dose instead of in three. There were no toxic symptoms due to atebrin. In a series of 168 cases treated with atebrin alone, not a single case suffered from abdominal symptoms ; but in another series which comprised 149 treated with plasmoquine and atebrin, 22 patients suffered from severe abdominal pain while many more complained of considerable discomfort.

The results of treatment were excellent, and the relapses in 168 cases of benign tertian were only 10·7 per cent. in six months, as compared with about 50 per cent. with quinine treatment. Here again atebrin was considerably cheaper than quinine, and there was also a saving of several days treatment. *W. F.*

RONNEFELDT (F.). Dosierungsfragen bei Kindermalaria. [**Dosage Problems in Malaria in Children.**]—*Klin. Woch.* 1933. June 24. Vol. 12. No. 25. pp. 986–987.

The author studied in the American Mission Hospital, Liberia, the results of atebrin treatment in malaria in 37 native children and was enabled to draw indirect conclusions on the mode of action and dosage of the preparation.

His main point is that the amount of atebrin necessary for cure must be controlled by the number of parasites in the blood, not by the body weight. He noted that in the children the cure was often delayed, probably due to underdosage. He surmises that the drug acts directly on the parasite, so that higher dosage is required. Another factor which he considers plays a part in the delay in cure is rickets in the children. So far, he states, no practical method of quantitative estimation of atebrin in the blood has been described ; such a method would help to solve problems connected with the distribution of atebrin in the body.

E. D. W. Greig.

FISCHER (Otto). Beiträge zur Atebrinbehandlung der Malaria. [**Atebrin Treatment of Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 339–341.

Recently the author has treated all cases of malaria at the convalescent home in Tubingen with atebrin with continued success.

His results have been good not only in patients with malaria parasites in the blood, but also in patients suffering from the after effects of malaria in which the blood was negative ; thus considerable improvement was noted in splenomegaly, secondary anaemia and loss of body weight. Beyond more or less yellow colouration of the skin no bad after effects from the drug have been noted. No injury to liver function occurred. It acted satisfactorily in a case of malaria in pregnancy at the eighth month. A case of malarial neuritis with parasites in the blood rapidly improved under atebrin treatment. *E. D. W. Greig.*

CHOPRA (R. N.), GUPTA (Biraj Mohan Das) & SEN (B.). **Atebrin in the Treatment of Indian Strains of Malaria.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 425–432.

Atebrin is not superior to quinine either in preventing relapses or as a prophylactic. Its action on asexual parasites is as sure but more gradual than that of quinine. Several slight toxic effects were noted.

The effects of atebrin were studied in a series of patients at the Carmichael Hospital for Tropical Diseases in Calcutta. Usually, the temperature went down on the second or third day of treatment, and by the fourth day the parasites had disappeared, excepting crescents, on which the drug had no effect. As compared with quinine, the authors found " that the action of atebrin on the asexual forms of the parasites is gradual and not so rapid." They did not find that it was superior in preventing relapses in man—at least five cases out of 39 relapsed—and they also obtained ample evidence that relapses were common in the experimental malaria of monkeys. As regards prophylaxis, " so far as we can see it has no more true prophylactic action than the cinchona alkaloids." The toxic effects of the drug were slight: headache, depression, loss of appetite, abdominal discomfort, diarrhoea, malaise, all of which disappeared on stopping the drug. It appeared to have little if any depressing effect on the cardio-vascular system and may be detected in the urine for 20 days or longer. *W. F.*

GANGULI (P.). **Treatment of Malaria with Atebrin with Records of Blood Pressure and Electrocardiogram.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Sept. Vol. 37. No. 9. pp. 413–423. With 10 figs.

Atebrin has a slight irritant action on the mucous membrane of the stomach, otherwise it gives rise to no unpleasant symptoms. In some cases there is a slight lowering of blood pressure, such as might be expected in febrile persons lying in bed while on a limited diet. " Effect on heart muscle as seen by electrocardiogram usually showed no change in the myocardium." *W. F.*

CHORINE (V.). L'atébrine dans le traitement du paludisme. [**Atebrin in Malaria.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 773–775.

The author reports deaths, possibly due to atebrin.

Seventeen general paralytics were infected with benign tertian by intravenous inoculation of blood, and they were afterwards treated with atebrin. One of the patients had epileptiform convulsions, three others developed icterus, and two of them died. The symptoms appeared a few days after finishing the treatment, and though the author says that there is no proof that they were due to atebrin, he evidently suspects that they were. *W. F.*

MASSA (M.). Presenza ed eliminazione prolungata dell' atebrin, dimostrabile alla luce di Wood. [**The Wood Light for demonstrating Excretion of Atebrin.**]—*Riforma Med.* 1933. July 1. Vol. 49. No. 26. pp. 980–982.

The Wood light or the Wood filter is employed for determining fluorescence in small amounts, too small in some cases to be visible by the unaided eye. Atebrin in the urine and the faeces and, before being excreted, in the blood itself, gives rise to a fluorescent body obvious when the drug is taken in doses of 3 cgm. daily. In examining for this in urine the procedure is as follows: 10 cc. urine is rendered alkaline by addition of 1 cc. of a 10 per cent. solution of soda; it is then extracted with ether and evaporated. When treated with 2–3 cc. of concentrated sulphuric acid or with 70 per cent. alcohol, a marked fluorescence results, yellow with the acid, green with alcohol.

If daily examinations are made of the urine of a patient who has been taking atebrin, this fluorescence, though gradually diminishing, can still be recognized up to 60 or even 70 days after the treatment has ceased. *H. H. S.*

PATERSON (A. C.). **Report on the Treatment of Malaria by Atebrin and Plasmochin Simplex.**—*West African Med. Jl.* 1933. Apr. Vol. 6. No. 4. pp. 68–70.

Toxic effects followed a combined treatment with plasmoquine and atebrin.

Six patients suffering from subtertian malaria were given atebrin 0·1 gram and plasmoquine 0·01 gram three times a day for four days, except in one case where the plasmoquine was omitted. Each of them, including the one who had no plasmoquine, complained of a constant dull pain across the abdomen which, in one, was very severe and accompanied by vomiting. Except in one case, the pain began the day after the treatment was finished. *W. F.*

DIXON (H. B. F.). **A Report on Six Hundred Cases of Malaria treated with Plasmoquine and Quinine.**—*Jl. Roy. Army Med. Corps.* 1933. June. Vol. 60. No. 6. pp. 431–439.

The relapse rate of 250 cases of benign tertian treated with quinine was 25 per cent.; the relapse rate of 215 primary cases of benign tertian treated with plasmoquine and quinine was only 4·18 per cent.

The patients were European soldiers, their wives and children, treated by the author at the Connaught Military Hospital, Poona. The relapse rate of 250 persons treated with quinine alone, prior to July 1929, was over 25 per cent. From July 1929 the treatment consisted of 0·04 gram of plasmoquine and 20 grains of quinine daily; from September 1930 the dose of plasmoquine was reduced to 0·03 gram daily. The duration of treatment was 21 days. The patients were kept in bed for 5 days, and in hospital for at least 10 days; for the remainder of the period they were excused duty. " It was found absolutely essential to keep men from doing strenuous work while they were attending for their 21 days treatment." Treatment was instituted at the earliest possible moment. The period of subsequent observation was from 3½ years to a minimum of 10 months. The average period was 2 years. There were no serious toxic symptoms, but with the 0·04 gram dose it was always possible to pick out the men in the ward who were on plasmoquine, by their grey, cyanotic appearance. "The reduction of the dose to 0·03 gram daily prevented any cyanosis whatever." The results of treatment were as follows:—Primary benign tertian: 215 cases, 9 relapses, 4·18 per cent. Relapsed benign tertian: 141 cases, 6 relapses, 4·7 per cent. Quartan: 5 cases, no relapses. Malignant tertian: the relapse rate was about 2 per cent. whether the patients were treated with plasmoquine and quinine, or with quinine alone.' (See MANIFOLD, this *Bulletin*, Vol. 28, p. 1007.)

W. F.

SCHWETZ (J.), BAUMANN (H.), PEEL & DROESHAUT. Notes thérapeutiques sur le paludisme du Congo. [**Therapeutic Notes on the Malaria of the Congo.**]—*Rev. Méd. et Hyg. Trop.* 1933. Jan.–Feb. Vol. 25. No. 1. pp. 24–35.

An account of clinical quinine prophylaxis in native children.

Eighty-two native children were examined, and 92·6 per cent. were found to have parasites in their blood. Some were given a month's treatment with 0·25 gram of quinine daily, and the rest received 0·50 gram of cinchona febrifuge. The percentage infected was reduced to 40 · but after three months without treatment it rose to 53 They were then given 0·25 to 0·50 gram of quinine daily for 1½ months, followed by the bi-weekly administration of the same doses for 3 months At the end of this time the percentage of those infected was 24 6 The bi-weekly dose was continued for 3 months longer, but the infection rate was not reduced further *P falciparum* is the commonest parasite, *P malariae* is common, but *P vivax* is extremely rare Parasites were very scanty in those children who remained infected at the end of the course and *P malariae* was rare Cinchona febrifuge (*Produits Roche*), which cost half the price of quinine, was found to be as powerful as quinine when given in larger doses *W F*

KARAMCHANDANI (P V) **Parenteral** *versus* **Oral Administration of Quinine.**—*Records of the Malaria Survey of India* 1933 June Vol 3 No 3 pp 445–473 With 3 figs [99 refs]

Injections of quinine should not be given except in special cases The author reviews the "literature" and describes his own experiments Before he undertook these investigations he was a great advocate of the subcutaneous injection of quinine, but he is now convinced that (except in special cases) it almost amounts to malpraxis Quinine administered orally, and retained, is as efficacious as when it is injected Injections produce local necrosis and afford favourable sites for the development of tetanus spores which is favoured by quinine on account of its reducing properties Tetanus may follow quinine injections, apart from any fault in technique Tetanus spores may be transported from one part of the body, such as the intestine, to the site of the injury produced by the inoculation, as demonstrated by SEMPLE In comatose and pernicious cases of malaria, where it is impracticable to give quinine by the mouth, it should be given intravenously as a 5 per cent solution of the acid hydrobromide In very obese people and in some children where the veins cannot be found it may be injected subcutaneously as a dilute solution of 5 grains of quinine acid hydrobromide in 10 cc of water or saline Injections should be given slowly Moulds grow readily in solutions of quinine , such solutions, therefore, should not be stored in rubber-capped bottles, but should be freshly prepared Boiling for 10 minutes does not alter the composition of the solution The administration of quinine by injection should always be undertaken by the medical officer himself, and never relegated to his subordinate staff *W F*

GROOTHOFF (A) & HENRY (T A) **The Preparation, Analysis and Standardisation of Totaquina.**—*Riv di Malariologia* 1933 Jan–Feb. Vol 12 No 1 pp 87–91.

In this paper the authors give the analysis of the four samples of totaquina, which were tested by Professor GIEMSA in avian malaria (see below, p 848) Totaquina is made in two ways Type 1 is made by extraction of the total alkaloids of suitable bark , Type 2 is prepared from the alkaloidal residues of quinine factories, with sufficient quinine added to bring it up to the required standard

Two of the samples, A and B, were made by extraction of the total alkaloids from the bark of *Cinchona succirubra* and C, which gave the best therapeutic results, from the bark of *C robusta* A, B, and C were whitish powders, completely soluble in dilute sulphuric acid Sample H was prepared from residual alkaloids, with sufficient quinine added to bring the mixture up to standard. It was a greyish-brown powder, almost completely soluble in dilute sulphuric acid, forming a brown solution. Totaquinas of Type 2 contain far more cinchonine than those of Type 1, and much less cinchonidine . The results of the examination of these samples by different workers were remarkable for their concordance. The methods of analysis have been published in the document, League of Nations, Health Organisation, Malaria Commission (C.H. Malaria 183).

As regards the preparation of Type 1 totaquina, laboratory experiments showed that, starting with a *C. succirubra* bark containing 5·4 per cent. of alkaloids, it was possible to recover 5·2 per cent. in the form of totaquina. The alkaloids were extracted with boiling benzene from the powdered bark previously mixed with slaked lime, and were removed from the benzene solution by shaking with dilute sulphuric acid. The aqueous alkaloidal solution so obtained was decolourized by heating with charcoal, filtered, and while still hot, run into excess of sodium hydroxide solution to precipitate the alkaloids. *W. F.*

GIEMSA (G.). Etude comparative d'échantillons de totaquina, de quinine et d'hydroquinine au point de vue de la toxicité et de l'efficacité dans le paludisme des oiseaux. **(Comparative Study on Samples of Totaquina, Quinine and Hydroquinine regarding their Toxicity and Efficacity in Bird Malaria.)**—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 70–86. With 1 fig. [12 refs.] English summary pp. 258–259.

Four samples of totaquina proved less effective in avian malaria and more toxic to rabbits, than quinine and hydroquinine.

The action of a drug upon the proteosoma of birds is a valuable indication of its action in human malaria, but the test is not infallible ; for example, dimeplasmin is effective in avian but not in human malaria, and salvarsan is effective in human but not in avian malaria. The route of administration is important ; for example, hydroquinine is hardly equal to quinine when injected subcutaneously into birds, but it is superior to it when given *per os*. The standard method of testing efficiency is to give the first dose of the drug *per os*, 3 to 4 hours after an inoculation of the virus, and to repeat it daily for 5 days.

The " margin of efficacity " of the drug under test is the relation of the smallest dose which prolongs the incubation to the largest dose which can be well supported. RÖHL obtained for quinine a margin of efficacity of 1 : 4, and for plasmoquine, one of 1 : 30. A method of holding birds for the purpose of administering drugs by the oesophageal tube is described and figured.

Four samples of totaquina (A, B, C, H) were compared with quinine and hydroquinine. Some of the fluid is often returned when the drugs are administered to birds *per os*, and a portion of the drugs may remain unabsorbed when they are inoculated under the skin ; therefore comparative toxicity tests were made by intravenous injections into rabbits. The minimum lethal doses in milligrams of drug per kilogram of rabbit was :—Totaquina C. 23·0, B. 25·2, H. 25·5, A, 34·5 ; Quinine, 39·5 ; Hydroquinine, 39·6. The therapeutic value was compared by the administration *per os* to canaries, of six daily doses, beginning on the day of infection, the efficiency of a drug being shown by the number of days which elapsed before parasites were found in the blood. The results, with doses of 1 milligram, were as follows :—Hydroquinine, 7·4 days ; Quinine, 6·2 ; Totaquina C. 4·8, H. 4·2, B. 2·6, A. 1. In short, all four samples of Totaquina, except A, were more toxic than quinine, and all were less effective therapeutically, especially A.

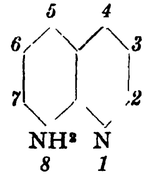
W. F.

STONE (C. T.), GASKILL (R. C.), SANDERS (J. P.), BARTON (J. C.), SCHULZE (V. E.) & DAWSON (W. T.). **Hydrocinchonidine and Hydrocinchonine in Malaria.**—*Amer. Jl. Trop. Med.* 1933. July. Vol. 13. No. 4. pp. 437–442. With 1 chart.

Hydrocinchonidine and Hydrocinchonine are closely related to quinine (methoxy-cinchonidine) and quinidine (methoxy-cinchonine); they occur naturally in cinchona bark in small quantities, but are usually prepared by catalytic hydrogenation of the corresponding common alkaloid, *e.g.*, hydrocinchonidine from cinchonidine. The authors treated 8 patients with 0·5 grams of hydrocinchonidine daily, and 11 with hydrocinchonine in the same doses, over a period of 4–6 days. The 19 patients comprised cases of both benign and malignant tertian malaria. The results were good, but they " do not necessarily indicate superiority to quinine or quinidine." Some of the patients treated with hydrocinchonine suffered from nausea and vomiting, but this may have been due to causes other than the drug. *W. F.*

FOURNEAU (E.), TRÉFOUEL (J.), M. et Mme., BOVET (Daniel) & BENOIT (G.). Contribution à la chimiothérapie du paludisme. Essais sur les calfats. (Deuxième mémoire.) [**The Chemotherapy of Malaria. Tests on Paddy-Birds.**]—*Ann. Inst. Pasteur.* 1933. May. Vol. 50. No. 5. pp. 731–744. [29 refs.]

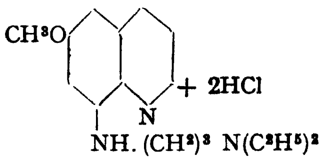
The authors prepared 48 substances derived from aminoquinoline-8, possessing consequently the nucleus :—



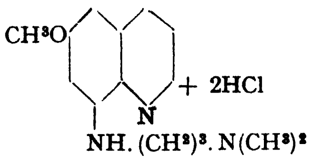
Thirty-eight possessed a parasiticidal action in bird malaria. Most of them were unstable and soon became toxic, but some appeared suitable for therapeutic use, particularly (1) 852, (2) 574 (6-methoxy-8-dimethylamino n-propylamino quinoline), (3) 710 (with diethylamino in place of dimethylamino), (4) 728 (8-diethylamino n-propylamino quinoline), (5) 735 (6-methoxy-8-diethylamino n-amylamino quinoline). Judging from their action in bird malaria and their toxicity for rabbits, these drugs are superior to plasmoquine. For example the chemotherapeutic index, in paddy-birds, of 735 is 1/150 while that of plasmoquine is 1/40, and the toxicity of 735 for rabbits is only about half that of plasmoquine. The chemotherapeutic index of 710 is 1/100. The chemotherapeutic index = the minimal daily dose which will cure in 5 days, divided by the maximum single tolerated dose. The tests were made on paddy birds (*Padda orizivora*) infected with *Hæmoproteus orizivorae.* Drugs which are active against this parasite are active against the gametes of human malaria. *W. F.*

MASSIAS (C.). Le " 574 " associé au quiniostovarsol dans le traitement du paludisme à *Plasmodium vivax* et à *Plasmodium praecox.* **[574 associated with Quiniostovarsol in the Treatment of Malaria.]** —*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 590–594.

The author treated 43 patients with dichlorohydrate-6-methoxy-8-dimethylamino-propylamino-quinoline (574), and he gives the following formula, with that of 710 for comparison.



FORMULA 710



FORMULA 574

He prefers it to 710, because of its slight toxicity, and its stability in a tropical climate. The daily doses employed were 0·08 gram of 574 with 1 gram of quiniostovarsol, divided into two parts and given just before meals, in cachets or tablets. A course of treatment lasted 7 to 10 days and was repeated after a week's interval. Two patients complained of vomiting. In no case did parasites persist as long as 7 days. In 8 cases where crescents were present, these disappeared within 2 to 6 days. Alkaline drinks, such as Vichy water or sodium bicarbonate, favour tolerance of the drug. *W. F.*

MARCHOUX (E.) & CHORINE (V.). Un corps nouveau actif sur *Plasmodium vivax.* **[A New Drug for Benign Tertian Malaria.]**—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1463–1464.

The new drug, 915, gives, the authors find, a permanent cure in most cases.

This concerns a new quinoline derivative, 915, from Fourneau's laboratory. It is said to be the salt of acetylamino-oxyphenylarsenic acid with diethylamino-undecylamino-methoxyquinoline. Combined in the proportion of two parts of 915 to one of stovarsol, this product consists of fine needle-like crystals. It is given by the mouth in cachets. The authors treated 7 cases of naturally contracted benign tertian and 37 cases of induced therapeutic malaria with the drug. They conclude that it cures most cases of benign tertian without subsequent relapse when 0·3 grams are given daily for 6 days. It is non-toxic, even in double these doses. Only one patient suffered any inconvenience; this was a boy of 16 who took 0·6 grams a day for 6 days and complained of slight epigastric pain. The activity of the preparation is not due to the stovarsol; two patients who were treated with pure 915 were cured without relapse. *W. F.*

CHARRON (E.). Sur un nouveau dérivé de la quinine à action gamétocide. **[The Gametocidal Action of a New Quinine Derivative.]**—*Rev. Méd. et Hyg. Trop.* 1933. Jan.–Feb. Vol. 25. No. 1. pp. 59–61.

The author investigated the action of quinine derivatives on cultures of the malaria parasites. He suggests that the gametocyte arises from the schizont.

Dihydroquinine was prepared by the hydrogenation of quinine in the presence of colloidal palladium. Dihydroquinamine was prepared from this, and from this again a number of other products; among them diethanol dihydro quinamine. This substance appears to have a powerful action not only on the schizonts but also on the gametocytes of *P. falciparum*. The experiments on which these conclusions are based were made by adding the quinine derivatives under examination to cultures of malaria parasites in test tubes. The author suggests that the gametocyte has its origin in a sexual cell liberated from the schizont at the time of the rupture. *W. F.*

KORESSIOS (N. T.). Essais de sérothérapie dans le paludisme. (**An Attempt of Serotherapy in Malaria.**)—*Riv. di Malariologia*. 1933. Mar.–Apr. Vol. 12. No. 2. pp. 353–362. English summary (7 lines) p. 453.

The author inoculated rabbits once a week, for a period of nine weeks, with the blood of patients suffering from benign tertian, his object being to prepare a serum containing malaria antibodies. Seven patients suffering from subtertian were inoculated with this serum, and one was inoculated with a serum prepared by inoculating rabbits with blood containing *P. falciparum*. The author states that the serum acted like feeble doses of quinine, and, in about 10 days, brought down the fever and reduced the number of parasites. He concludes that it contains a specific, antiparasitic substance [but on reading the details of the cases, one is not convinced of this]. The serum is, naturally, strongly haemolytic, and may produce great anaemia and fever. *W. F.*

LIO (Giuseppe). Malaria ed autoemoterapia. [**Autohaemotherapy in Malaria.**]—*Riv. Sanitaria Siciliana*. 1933. Feb. 15. Vol. 21. No. 4. pp. 265–268. English summary (2 lines).

The method employed by the author is so simple and easy of application and the results as recorded by him are so striking that others will doubtless make trial of it and its true value be determined. Twenty-six patients are referred to, 24 natives of Somalia and two others. All were infected by the subtertian parasite. His technique was to draw off 10 cc. of blood from the median cephalic vein, without added citrate and inject it (never less than 5 cc. and usually the whole amount) intramuscularly into the gluteal region on alternate days, 4–7 in all, usually 3 injections being given after the fever disappeared. Nineteen of the 24 had no quinine, 2 were given the blood injections after quinine had proved ineffectual, the remaining three had at the same time as the injections 1 gm. quinine by mouth.

In 16, the fever disappeared after the first injection, in 3 after the second, 3 after the third and 2 after the fourth. Six were given quinine after the injections were ended and 2 had quinine and arsenic; 16 had neither.

Of the two other patients, one was intolerant of quinine; a dose of 20 cgm. gave rise to headache, tinnitus, blurred vision, drowsiness, vomiting, diarrhoea, cardiac disturbance and rash. Six injections were given on alternate days, as in the other cases, and the fever fell at the third. The other patient proved very resistant to the effect of quinine. For 8 days he took 2 gm. daily by mouth and for 5 days he had intramuscular injections, but the parasites persisted. He was given four blood injections; the fever disappeared after the first.

[There is no mention as to the length of time the patients were kept under observation subsequently, to see if any relapse occurred.]

H. H. S.

BOYD (Mark F.) & STRATMAN-THOMAS (Warren K.). **Studies on Benign Tertian Malaria. 2. The Clinical Characteristics of the Disease in Relation to the Dosage of Sporozoites.**—*Amer. Jl. Hyg.* 1933. May. Vol. 17. No. 3. pp. 666–685.

Mosquitoes which are heavily infected are more regular producers of infection, and the disease produced is more severe, longer, more prone to relapse, and has a shorter incubation period than is the case when the infection is conveyed by lightly infected mosquitoes.

Sixty-one mental patients at the Florida State Hospital were infected with benign tertian malaria by laboratory-bred *A. quadrimaculatus*; a minimum of two mosquitoes being employed in each case. Thirty-eight batches of anopheles were used. Ten mosquitoes of each batch were dissected before any therapeutic feedings were made, and the batches were classed provisionally according to the numbers of oöcysts. Subsequently, they were all dissected and a final classification was made. Those batches in which no mosquito contained more than 30 oöcysts were classified as " poor." Those in which at least half the mosquitoes contained over 50 oöcysts were classified as " good." Intermediate batches were " fair."

Where " poor " batches were employed, there were 75 per cent. of failures. In successful cases, the incubation period averaged 15·7 days. Spontaneous cure, without treatment, occurred in 90 per cent The attack generally began with intermittent tertian fever, and there were fewer chills. The relapse rate was 30 per cent.

When " good " or " fair " batches were employed, there were about 10 per cent. of failures. In successful cases, the incubation period was 13 to 14 days. Spontaneous cure occurred in 63 per cent. of those infected with the " fair " batches, and in 51 per cent. of those infected with the " good." The attack generally began with intermittent quotidian, and there were more chills. The relapse rate was about 55 per cent.

In 7 cases, it was " deemed advisable to terminate infection—while it was still clinically active," by Sinton's treatment. Five of these cases relapsed within 5 to 7 months. Fifty-four cases terminated spontaneously, and were then given Sinton's treatment prior to discharge; there were no clinical recurrences in this group. The maximum of success in inoculation occurred when four or more mosquitoes were allowed to bite, but there was no consistent relationship between the number of mosquitoes and the severity of the attack. The attack may begin as remittent fever, intermittent quotidian or intermittent tertian. A remittent fever was observed only at the beginning of an attack; it occurred in one-third of the cases, and was usually succeeded by intermittent quotidian, which was the most common type. The fever in relapses was intermittent. When all three types were included in an attack, they followed the sequence given above. *W. F.*

MAYNE (Bruce). **The Injection of Mosquito Sporozoites in Malaria Therapy.**—*Public Health Rep.* 1933. Aug. 4. Vol. 48. No. 31. pp. 909–916.

Sporozoites can be kept alive in citrated blood for several days, and may be sent by post, in this medium, for use in distant institutions.

The salivary glands of an infected mosquito are flooded with 0·5 cc. of sterile 2 per cent sodium citrate on a glass slide They are then taken up in a syringe and injected into a rubber-capped bottle containing 10 cc of freshly-drawn, defibrinated human blood mixed with 1 per cent dextrose The bottle is kept at a temperature of 50°F (10°C) At higher temperatures, there is danger of an overgrowth of contaminating bacteria, at lower temperatures, the sporozoites perish They will remain alive and infective, at 10°C in this medium, for as long as 5 days It is troublesome and costly to send infected mosquitoes to distant institutions, but bottles containing sporozoites can be sent by post Therapeutic inoculations, which are given preferably by the intramuscular route, are followed by incubation periods of 10 to 12 days in subtertian, 13 to 22 in benign tertian, and 32 in quartan An instance of the extraordinary power of a single mosquito to infect several people is given by the author, a single insect infected more than 10 people by biting, and when its salivary glands were subsequently dissected, they were found to contain sufficient sporozoites to infect several more by inoculation Two per cent sodium citrate solution may be used instead of the blood medium, but apparently the sporozoites die sooner *W F*

SAUTET (Jacques) A propos des associations parasitaires dans le paludisme Application à la malariathérapie [**Mixed Infections.**] —*Rev Méd et Hyg Trop* 1933 Jan-Feb Vol 25 No 1 pp 50-54

It is difficult to distinguish the young rings of the three species of malaria parasites from one another, or to be sure that a patient with one species of parasite in his blood is free from latent infection with another It is advised, therefore, that when a wild strain of malaria is required for malaria therapy it should be obtained from a patient with relapsing benign tertian who has not been exposed to infection for at least a year *W F*

MOLLARET (Pierre) L injection de sang comme procédé de déclenchement des acces, dans les échecs ou les arrêts du paludisme thérapeutique [**Injections of Blood to provoke Malaria Paroxysms.**]—*C R Soc Biol* 1933 Vol 113 No 19 pp 299-300

In the practice of malaria-therapy, it sometimes happens that spontaneous cure occurs before a sufficient number of paroxysms has occurred The author has found that the subcutaneous or intramuscular inoculation of 5 to 10 cc of blood is far more effective than injections of adrenaline or a vaccine, in resuscitating and stimulating the infection The patient's own blood appears to act as well as another's

W F

BOYD (Mark F) & STRATMAN-THOMAS (Warren K) **A Note on the Transmission of Quartan Malaria by** *Anopheles quadrimaculatus.*—*Amer Jl Trop Med* 1933 May Vol 13 No 3 pp 265-271

Patients were successfully infected by the bites of laboratory-bred mosquitoes.

Twenty-five laboratory-bred *A quadrimaculatus* were fed on a patient who had been infected with *P malariae* by means of blood inoculation. The mosquitoes were kept at 20°C. Eighteen died within 30 days and oöcysts were found in 6. On the 32nd day, one of the remaining mosquitoes fed on a woman, and on the 39th day another fed on her. These two mosquitoes died a few days later, and sporozoites were found in both. Twenty-seven days after the first feed, quartan parasites were found in the woman's blood.

A second strain was obtained by feeding *A. quadrimaculatus* on a woman with a naturally acquired quartan infection. About 32 per cent. of the mosquitoes which fed became infected, and the infection was conveyed to other persons by their bites, The incubation period of *P. malariae* in the mosquito is 30 to 35 days at 20°C.; *P. vivax*, 16 days; *P. falciparum*, 22. The incubation period of *P. malariae* in man is also longer than that of the two other parasites. *W. F.*

MAJID (Syed Abdul). **Note on Some Unsuccessful Attempts to Infect a Monkey by Injections of Living Malarial Sporozoites.**—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 475–477.

A very young specimen of *Silenus rhesus* (*Macacus rhesus*) received two subcutaneous and one intraperitoneal injection of living sporozoites from the salivary glands of three *A. culicifacies* found infected in nature. Thick and thin film examinations were made for a period of about 100 days after the first inoculation, and for 40 days after the second. The results were negative. [GREEN similarly obtained negative results in the inoculation of *Silenus irus* (*Macacus cynomolgus*) with sporozoites from mosquitoes fed on human cases of subtertian malaria [this *Bulletin*, Vol. 29, p. 702].] *W. F.*

BENARROCH (E. I.). Observations sur l'exflagellation des microgametocytes du paludisme humain. (**Observations on the Flagellation of the Microgametocytes of Human Malaria.**)—*Riv. di Malariologia.* 1932. Sept.–Oct. Vol. 11. No. 5. pp. 610–614. English summary (7 lines) p. 750.

Five untreated patients were examined 45 times—with the result that exflagellation of gametocytes was seen twice in one patient, and once in each of the others. Three treated patients were examined 20 times but, in them, no gametocytes were observed to flagellate. Anopheles fed on patients where flagellation is not present do not become infected. Occasionally it happens that no infected mosquitoes can be found although both anopheles and gametocyte carriers are very numerous; it is suggested that at such times and seasons the gametes have temporarily lost their power of flagellating and, consequently, of infecting anophelines. *W. F.*

CHORINE (V.) & GILLIER (R.). Recherches sur le mécanisme de la réaction de Henry. [**The Mechanism of Henry's Reaction.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1419–1420.

Neither melanin nor ochre pigment produces a positive Henry's reaction in rabbits.

HENRY considers that his reaction is due to the action of the malaria parasite on the red cells, whereby the parasite transforms the haemoglobin into melanin, and forms the ochre pigment, which accumulates in the liver, by destroying the red corpuscles. The authors inquired if melanin or ochre pigment inoculated into rabbits would produce a positive Henry's reaction. They injected melanin from a horse's sarcoma, because ox-eye pigment was unsuitable for intravenous injection. The ochre pigment they produced in abundance by inoculating rabbits intravenously with water. Neither of these procedures caused the rabbit's sera to give a positive Henry's reaction. *W. F.*

MOLDAWSKAJA-KRITSCHEWSKAJA (W. D.), GRITZAY (P. K.) & UMAN (G. M.). Das Problem der Dauerinkubation bei Malaria im Lichte der Melanoflokkulationsreaktion. **[Prolonged Incubation Period of Malaria Studied in the Light of the Melanoflocculation Reaction.]**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. May. Vol. 37. No. 5. pp. 252–255.

The problem which the authors sought to solve with the help of the melanoflocculation reaction (RMF) was, whether the cases of malaria met with in the spring of the year had contracted the infection in the previous autumn and were incubating it until it became manifest in the spring or if they were examples of latent infection with resultant changes in the body.

The investigations were carried out at the malarial village of Eschar (S. Russia), and were commenced in March 1932. 24 persons were investigated, none of whom gave a history of malaria. Blood examination showed that none of the 24 had parasites in the blood; in 3 the spleen was enlarged. The RMF was negative in 3, doubtful in 2, positive in 19. Of the 19 positive, 10 developed attacks of malaria, 3 in April, 3 in May, 4 from June to October; 9 are under observation and have had no attacks. In some of these cases *P. vivax* appeared in the blood and the spleen became enlarged, From their observations the authors conclude that the question of the " prolonged incubation period " in early spring cases of malaria must be revised by means of the RMF in view of the possibility of their being cases of latent infection. In old-standing latent malaria there are no clinical manifestations that can be determined by accurate investigation. The RMF is a pathognomonic reaction for malaria and can be employed as a useful diagnostic measure long before clinical signs appear.

E. D. W. Greig.

i. LE BOURDELLÈS (B.). Malaria-floculation et paludisme chronique. **[Henry's Malaria-Flocculation in Chronic Malaria.]**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1933. June 12. 49th Year. 3rd Ser. No. 19. pp. 744–752.

ii. THÉOBALT (E.). La malaria-floculation de Henry. Etude de cent cas cliniques. **[A Hundred Clinical Cases studied by Henry's Reaction.]**—*Ibid.* pp. 753–755.

i. The results of Henry's reaction in the examination of 204 persons who had formerly suffered from malaria support the view that repatriation to a non-malarious country is soon followed by complete cure, and that the recorded cases of infection persisting over years are examples of an exceptionally rare condition.

Thirty-six healthy persons who had suffered from malaria during a short residence in a malarious country—many of them about 14 years before—gave 33 negatives, 1 positive and 2 feeble positives. Twenty-three persons showing no signs of malaria, but who had lived for many years in an endemic area, and had suffered repeatedly from it before their repatriation to France, gave no positives. One hundred and forty-five persons who had lived in an endemic country and had probably suffered from malaria, also gave no positives.

The serum of a blood-donor was examined. This man had lived in the tropics but he had never had an attack of malaria, nor were parasites ever found in his blood ; yet its inoculation infected his two children with quartan malaria. The result of Henry's reaction was massively positive, and the author considers that the test should always be applied in the case of donors where there is any likelihood of latent malaria. This paper contains a list of reported cases of malaria persisting over long periods, and a concise review of the results of Henry's reaction.

ii. The author gives the results of Henry's reaction applied to a hundred soldiers who had returned from the colonies. These were positive in 30 and accorded with the "histories", clinical signs, and blood examinations. None of the 70 negative cases showed signs of malaria while in hospital, nor were any of them sent to hospital, on account of malaria, for a period of two years. *W. F.*

LE BOURDELLÈS (B.) & FRIBOURG-BLANC (A.). Malaria-floculation et malariathérapie. [**Malaria-Flocculation (Henry's Reaction) and Malaria-Therapy.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1933. July 17. 49th Year. 3rd Ser. No. 24. pp. 1013–1022. With 1 chart.

Henry's reaction was investigated in 9 cases of therapeutic inoculation. It was negative before inoculation, but became gradually positive after 2 to 10 attacks. It was never positive during incubation. When the patient was cured it became negative. It was positive in two cases, ten and five months after inoculation, but became negative a month later. It was negative in six cases, examined from 8 months to 7 years after infection. In 8 cases, the serum albumen decreased and the globulin increased as the reaction became positive, and the protein quotient was consequently lowered ; but such alterations in the proteins of the blood also occur in diseases in which Henry's reaction is negative, and in some cases of malaria the reaction is sometimes strongly positive when the protein quotient is unaltered. The author therefore concludes that alteration of the protein quotient does not account for flocculation. [See TAREEV and GONTAEWA, *ante*, p. 487.] *W. F.*

BIASIOTTI (Marcello). La reazione di Henry nella diagnosi sierologica della malaria. [**Henry's Reaction in Diagnosis of Malaria.**]—*Policlinico.* Sez. Med. 1933. Aug. 1. Vol. 40. No. 8. pp. 557–568.

After describing Henry's two tests—Melanoflocculation and Ferroflocculation—the author relates his own experiences in a considerable number of cases : 154 patients in their first attacks and 47 in relapses, 25 normal individuals and 25 suffering from diseases other than malaria, such as typhoid, paratyphoid, syphilis, eruptive fever.

The malaria patients were practically all cases of infection with *P. falciparum*, who had been under intensive treatment with quinine and whose blood was negative for parasites. Nearly all the tests were carried out during apyrexia (as recommended by HENRY). In six nerve cases (five general paralytics and one encephalitic) the reaction usually became positive after the 6th-7th access of fever (in one patient after the second) He found that the use of quinine in large doses, plasmoquine, atebrin, etc , which brings down the temperature and drives the parasites from the peripheral blood, does not modify the reaction till after a long time , the reaction remains as positive evidence of earlier infection

In brief detail the results were —

1 Among 154 primary malaria patients the reaction was positive in 125

2 Among 47 relapse cases, it was positive in 41

3 It was constantly negative in the 25 normal individuals

4 Similarly negative in the 25 suffering from other diseases

He, therefore, confirmed Henry s work in finding the reaction positive in the apyrexial periods of both acute and chronic malaria weakly positive or frankly negative in the febrile accesses negative also in well treated cases who have had no attacks for several years , useful, consequently in those in whom malaria is suspected but in whose blood parasites are not found and whose spleens are not enlarged From the tables presented it will be seen that in a large majority the two tests are in agreement , for cases where one is positive and the other negative the tables must be consulted as the disagreements are too irregular for more than a summary statement to the effect that in the primary malaria patients 31 gave a melanoflocculation alone whereas only 3 gave the ferro and not the melanoflocculation, in the relapse cases 9 gave the former and not the latter while in one only was the reverse seen In the paralytic patients the tests were in agreement in every case. *H H S*

LIVIÉRATO (S), VAGLIANO (M) & CONSTANTACATO (G) Utilisation d'un nouvel antigene pour le diagnostic de la malaria par la méthode de floculation [**A New Antigen for Henry's Reaction.**]—*Grèce Med* 1932 Nov Dec Vol 31 No 11–12 177–178

The sac of a cuttle fish with its contents is cut up into small pieces and put into a sterile tube , 40 cc of sterile distilled water are added, and 0 02 cc of formalin After 24 hours at room temperature, the supernatant fluid is pipetted off , it is kept in the ice-chest for two months before use and is shaken daily It is diluted to make a slightly blackish fluid just before use The results are the same as those obtained with Henry s ox-eye melanin (See this *Bulletin*, Vol 29, p 716, the same paper from another source) *W F*

PANAGIA (Antonino) I parassiti della malaria filtrano attraverso le candele porose ? (**Do Malaria Parasites pass through Porous Filters ?**)—*Riv di Malariologia* 1933 Jan–Feb Vol 12 No 1 pp 115–117 English summary p 260

The author remarks on the work of ASCIONE and MARIOTTI who reported producing malaria by injecting the filtered blood and cerebrospinal fluid of malarious patients into healthy subjects (*ante*, p 487 and MARCHOUX *et al*) , they used Berkefeld V and N

In explanation they put forward two hypotheses : (1) that the merozoites in the blood underwent such modification that they could pass the filter, or (2) that the parasite was present in a " filtrable phase," capable of regeneration later to produce the disease [the difference would appear to be small].

The author took blood from two patients, one with subtertian infection, the other with quartan, 5 cc. in each case and mixed it with 45 cc. of isotonic citrate and chloride of sodium, and filtered the former through Chamberland F, the latter through this and Berkefeld V. He injected intravenously one person with the subtertian blood filtrate and 6 with the quartan. The first suffered in half an hour with shivering and a rise of temperature to 38°C., but though all seven were carefully observed for 2 months, they gave no indication of malarial infection. The author asks whether *P. vivax* may behave differently as regards filtration from the other malaria parasites. [As ASCIONE and MARIOTTI's experiments were with paralytics they probably used benign tertian blood, but their article does not state this as a fact.]

H. H. S.

ZOZAYA (Carlos) & ESPINEL SABOGAL (Samuel). Sobre la pretendida filtrabilidad del *Plasmodium vivax.* **[The So-called Filtrability of** *P. vivax.*]—*Medicina Países Cálidos.* Madrid. 1933. July. Vol. 6. No. 4. pp. 310–325. [12 refs.]

The authors, referring to the reports of ASCIONE and MARIOTTI and PANAGIA, state that in connexion with this question three distinct problems arise : 1. Are there filtrable forms of the plasmodium, with corresponding biological properties, analogous, *e.g.*, with *Myco. tuberculosis* ? 2. Can the plasmodium under certain circumstances pass the barrier between the blood and the cerebrospinal fluid ? 3. If so, what data can we obtain to elucidate obscure points concerning the cerebrospinal fluid, its circulation, re-absorption, etc. ?

Details are given of ten observations on patients suffering from some form of nervous disease and inoculated with benign tertian parasites, and the authors conclude : (1) that they have been unable to confirm the findings of ASCIONE and MARIOTTI ; (2) that in one patient among five inoculated with cerebrospinal fluid, clinical symptoms resembling those of malaria were produced, but no parasites could be detected in the peripheral blood ; whether the symptoms were malarial in nature calls for further investigation; (3) that there is a possibility that the blood parasites may cross the barrier but the questions then at issue would be whether there was any biological [? structural] modification or unusual meningeal permeability. *H. H. S.*

TROISIER (J.) & MODALDI (T. de Sanctis). L'hématozoaire du paludisme passe-t-il à travers les filtres ? **[Is the Malarial Haematozoon a Filter-Passer ?]**—*C. R. Soc. Biol.* 1933. Vol. 113. No. 20. pp. 347–350.

The authors filtered a 10 per cent. mixture of blood and isotonic citrate solution through Chamberland L^2 candles. The results were negative and confirmed those of MARCHOUX [see p. 487, above].

W. F.

BOUYOUCOS (B.). La mobilisation des hématozoaires vers la circulation périphérique sous l'influence de l'adrénaline. [**Appearance of Haematozoa in the Peripheral Circulation under the Influence of Adrenalin.**]—*Bull. Soc. Path. Exot.* 1933. Apr. 5. Vol. 26. No. 4. pp. 594–600. [12 refs.]

In order to obtain accurate information as to the value of injections of adrenalin in the diagnosis of malaria, the author has carried out a series of careful observations in which, by the use of a faultless technique he has been certain before the administration of the drug that malarial parasites were absent from the peripheral blood of the cases. He has found that the adrenalin may cause parasites to appear in the blood but only in very small numbers, in 15 to 30 minutes after the injection. They remain there for two or three hours and then disappear. This action of adrenalin is the more marked the nearer its administration is to the last attack. Within a few days of the attack a positive result may be expected in three quarters of the cases. When it comes to a question of three to six months after, the result is generally negative. *C. M. Wenyon.*

NEUMANN (Harry). Der Nachweis des parasitiziden Antikörpers bei der Malaria des Menschen. (**Demonstration of Parasiticidal Antibodies in Human Malaria.**)—*Riv. di Malariòlogia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 319–334. With 1 fig. English summary (8 lines) p. 452.

In 2 out of 4 serum experiments a parasiticidal antibody was determined in the blood of patients suffering from benign tertian malaria.

The blood containing numerous parasites (schizonts) was drawn immediately before the onset of the fever, defibrinated and preserved for 48 hours in an ice chest. The blood, from which the serum was obtained, was taken about a day after the completion of the attack. The serum and blood containing the parasites was mixed, and allowed to remain in contact, and then injected intramuscularly into another patient, and the result noted. The author finds that serum from naturally infected patients does not protect against an attack of fever, when the sporozoites are dissected from the salivary glands of the mosquito and mixed with the patient's serum, and then injected intramuscularly into another patient. He explains this apparent contradiction to the results of the serum experiments with blood parasites by stating the insect sporozoites (which he regards as saprophytes) are changed in the human body into " blood or body specific " blood parasites, that is, their antigenic property is determined by the different host.

E. D. W. Greig.

VAN DEN BRANDEN (F.) & NELIS (P.). Contribution à l'étude de l'hypocholesteremie dans le paludisme. [**Hypocholesteraemia in Malaria.**]—*Ann. Soc. Belge de Méd. Trop.* 1933. June 30. Vol. 13. No. 2. pp. 215–217.

The authors employed Grigaut's colorimetric method for the estimation of cholesterol in the blood of 8 cases of malaria. The normal quantity, according to GRIGAUT, is from 1·5 to 1·8 grams per litre.

The cholesterol was reduced to 0·68–1·0 in four of the cases ; in the other four, it was within normal limits. Examples from other authors are quoted which show that the cholesterin content is diminished in severe cases. *W. F.*

KRITSCHEWSKI (I. L.) & HALPERIN (E. P.). Ueber die Medikamentfestigkeit der Erreger der Vogelmalaria (*Plasmodium praecox*). II. Der Einfluss des geschlechtlichen Vermehrungszyklus auf die Medikamentfestigkeit. [**The Effect of the Sexual Cycle of *Plasmodium praecox* of Birds on Drug Resistance.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 79. No. 1/2. pp. 149–162.

In this paper the authors communicate their researches on the problem of the retention or loss of experimentally produced quinine resistance in *Plasmodium praecox* in birds after the sexual cycle has taken place in *Culex pipiens.*

The authors carried out a series of carefully controlled observations which are fully detailed in a series of protocols. They reach the following conclusions as a result of their experimental work :—(1) That a quinine resistant strain of *Plasmodium praecox,* which has passed through a sexual cycle in *Culex pipiens,* sometimes retains, sometimes loses, its drug resistance. (2) The problem of the nature of drug resistance in protozoa (whether it is mutation or variation) does not lend itself to solution by this line of investigation. (3) Easily produced quinine-fast strains of *Plasmodium praecox* can be transmitted as such to healthy individuals by mosquito bites. *E. D. W. Greig.*

JERACE (Felice) & GIOVANNOLA (Arnaldo). L'azione sterilizzante della plasmochina sui gameti dei parassiti malarigeni e sua importanza profilattica. (**The Destructive Action of Plasmoquine on the Malarial Gametocytes and its Prophylactic Value.**)—*Riv. di Malariologia.* 1933. May–June. Vol. 12. No. 3. pp. 457–477. With 10 graphs. [22 refs.] English summary (8 lines) p. 652.

Several points are dealt with in this article to which an abstract cannot do full justice. Those who wish for more detail must consult the original.

The authors' researches were carried out on 32 patients with gametocytes of *P. falciparum.* Of thirty-one examined by the authors, 20 had been treated with quinine, 9 with atebrin alone and 2 with both drugs. On each day of observation and at the same hour the number of leucocytes per cmm. was counted and the number of gametocytes per 100–1,000 leucocytes ; thus were obtained data for estimating the gametocyte content per cmm. of blood. At the same time flagellation of the microgametocytes was observed, by placing the blood smears at a temperature of 26°C. for 15 minutes and then staining with Giemsa.

On each of the subjects 50 anopheles were allowed to feed for 15 minutes by application of a gauze cage (gabbiette di tulle) to the inner surface of the thigh. In this way could be determined whether the gametocyte carriers were still able to infect anopheles, in spite of receiving treatment with quinine and atebrin. After the first application of the anopheles the patients were given 2 cgm. plasmoquine (*i.e.,* from 0·025–0·037 cgm. per kilo body weight). For the first 9 quinoplasmin, 2 tablets (plasmoquine 2 cgm., quinine 60 cgm.) was used ; for the other 23 plasmoquine simplex.

The anopheles, after feeding, were placed in a thermostat at 25°C. in an atmosphere saturated with moisture. Any dying in the early days after the feed were dissected and examined immediately ; the remainder, starting from 5 days after the blood meal, were killed with chloroform and examined Throughout the whole experiment 7,873 *A. maculipennis* were used, 2,300 were allowed to feed before the administration of the plasmoquine and 5,573 in the days following

The authors were able to show that previous treatment with quinine and atebrin, though having good results as regards the acute stage of infection, had not diminished the infectivity of the gametocytes Prior to the administration of plasmoquine, of every 100 anopheles examined 32·5 were infected On the day after the administration of 2 cgm plasmoquine 951 out of 1,321 anopheles feeding were examined [no reason is given for ignoring the others], 28 were found infected, or 2 9 per cent, on the second day after one only out of 1,089 examined was found infected, and on succeeding days up to the seventh none was found among 2,071 examined

Also, on the first day after the plasmoquine was given, the number of gametocytes increased, but thereafter they diminished rapidly Thus, among 31 patients there were, prior to the taking of 2 cgm plasmoquine, an average of 497 crescents per cmm, on the next day (first day after), 611, on the second 306 (average in 30 patients) on the third 126 (30 patients), on the fourth 14 (10 patients), on the fifth 5 (9 patients), and thereafter none They found that these small doses of plasmoquine did not kill the microgametes, but seemed to have a sterilizing effect upon them, and in many the microgametocytes became rounded and even after 30–40 minutes' observation had not emitted any flagella

They state that the duration of the gametocidal effect of this small dose of 2 cgm lasts for a week [the reviewer cannot find the evidence in the article on which this is based] This dose, they affirm, is quite innocuous and to obtain successful prophylaxis this dose weekly, or in a zone of severe endemicity twice a week, would suffice The article contains good tables and graphs *H H S*

CLEMESHA (W W) **Brief Note on the Results obtained with Anti-Gametocyte Treatment Only, without Antilarval Measures.** – *Indian Med Gaz* 1933 Apr Vol 68 No 4 pp 199–202 With 1 chart

" It is possible to control entirely the spread of malaria by careful anti-gametocyte work "

The author's method was to give two doses of quinoplasmoquine twice a week to every person on the estate On very malarious estates, this treatment was continued throughout the year, on the less malarious, it was limited to the malaria season the search for and cure of gametocyte carriers being undertaken a month before In those cases where malaria occurred in spite of these measures, the attack was exceptionally mild, and lasted only 2 to 4 days Tertian and subtertian parasites were rare and gametocytes were absent, quartan trophozoites and gametocytes were more frequent and appeared to be more resistant to the drugs On one estate with 105 coolies, which was bounded by rivers breeding *A culicifacies*, the drug was administered by the manager himself, with the result that the labour force was kept entirely free from malaria during a moderately severe outbreak among the surrounding population On another estate where the coolie lines were situated within a hundred yards of a river and it was quite impossible to do anything in the shape of antilarval measures, regular dosing twice a week was continued throughout the year, beginning in January 1931. In 1930, there were 80 cases of malaria; in 1931, there were 29 cases; in 1932 there were 10. The only parasite that survived was quartan; in November 1932, 10 per cent. of the children were infected with it, and atebrin is now being tried. Several other examples are given [see this *Bulletin*, Vol. 28, p. 576]. *W. F.*

CLARK (Herbert C.) & KOMP (W. H. W.). **A Second Year's Observation on Malaria in Some Unsanitated Chagres River Villages with Special Reference to the Use of Quinine and Plasmochin.**—Read before the National Malaria Committee, November 18th, 1932, Birmingham, Alabama. 7 pp.

The parasite index was reduced by about 60 per cent. in Panama villages. Quinine was the principal factor in this reduction. Plasmoquine is too expensive for use on plantations and oil-fields in the tropics.

This is a continuation of work done in 1931 (this *Bulletin*. Vol. 29, p. 689) and concerns five villages in the midbasin of the Chagres River in Panama, with a total population of about 1,100. During 1931, quinine for voluntary consumption was provided for all those who had parasites in their blood. During 1932, quinine was continued and, in addition, plasmoquine was given to as many of the inhabitants as could be reached, in doses of 1 centigram twice a week, with the object of rendering the crescents non-infective to *A. albimanus*, the vector. Monthly blood surveys, with thick films, were made throughout the year. "Quinine sulphate powder was placed in the hands of an intelligent woman selected by the people of each village . . . this method . . . was not as effective as could be wished." The authors administered the plasmoquine themselves, at their bi-weekly visits, and left a supply for absentees. "In all, 387 persons took at least 75 per cent. of the treatment, out of a total number of about 680 . . . all received some of the drug at one time or another." The effect upon the parasite rate was as follows: 1930, before treatment 45·6; 1931, after 1 year of voluntary quinine, 21·6; 1932, after 8 months quinine and plasmoquine, 16·8. "This occurred in the face of a stationary malaria rate in a number of unsanitated areas in other parts of Panama." The authors conclude that the decrease in the malaria rates is due to increased efficiency in the use of quinine, rather than to any other single factor involved. They consider that, in view of the high cost of plasmoquine and the large labour force involved, its use under field conditions is not justified in commercial ventures on the coastal plains, where large numbers of natives are employed. Malaria in a foreign white population can be reduced to negligible proportions, as has been demonstrated in the Canal Zone, but this work is backed by the resources of the United States, at a cost of about 67 cents per head of the inhabitants of the zone. *W. F.*

HANAFIN (P. J.). **Plasmoquine as a Malaria Prophylactic.**—*Jl. Roy. Army Med. Corps.* 1933. June. Vol. 60. No. 6. pp. 422–430. With 3 figs.

A daily dose of 0·02 gram of plasmoquine without quinine, did not prove successful during a three-months' campaign.

Five officers and 35 men left a non-malarious station, lived for 3 nights in a highly malarious area, returned to the non-malarious station and were under observation for several weeks. During the 3 days of exposure and the following 3 days, 18 of these persons received 10 grains of quinine daily; the remaining 22 received 0·02 gram plasmoquine. There were 5 cases of malaria in the quinine group, but only 2 in the plasmoquine group. Subsequently, all the troops engaged in suppressing the rebellion in the jungles of Lower Burma, during 1931, were given prophylactic treatment. Half were given 10 grains of quinine daily, and the remainder were given 0·02 gram of plasmoquine. Altogether 5,147 men were dealt with over a period of three months. " Fewer fresh cases occurred amongst the plasmoquine groups, but the number of relapse cases was much higher in these groups than in the quinine groups. . . A dose of 0·02 gram is definitely too small. . . . Toxic effects even in men undergoing most strenuous exertion are far less than hitherto expected." [Cases of subtertian malaria occurring in the group receiving treatment with plasmoquine would be uncontrolled by the drug.] *W. F.*

LABUSCHAGNE (Paul N. H.). **Some Considerations on Atebrin as an Active Anti-Malaria Measure.**—*South African Med. Jl.* 1933. May 27. Vol. 7. No. 10. pp. 332–335.

Estate labourers were treated with atebrin. The results were fairly good.

The author has treated 750 cases of malaria on estates in Natal with atebrin in various doses. The percentage of cures (about 60 per cent.) was " much higher than hitherto experienced with any other drug." The best results were obtained by giving 4 tablets daily for 5 days, and subsequently once a week. By this means the blood was kept free from parasites. " This being the case the proposition seems to boil down to the simple measure of ' atebrinizing ' the whole community without any regard to anti-larval work." *W. F.*

JUNGE (Werner). Prophylaxeversuche mit Atebrin. [**Atebrin Prophylaxis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. June. Vol. 37. No. 6. pp. 294–299.

The author carried out prophylactic observations on 6 volunteers at Bolahun, Liberia, West Africa, where all three forms of malaria are constantly present.

To three of the volunteers he gave daily 0·1 gm. atebrin and to the other three 0·1 gm. atebrin and 0·01 gm. plasmoquine. The investigations were undertaken during the period 1st July to 1st November 1932. It was determined that of 200 natives of Bolahun 72·7 per cent. had malaria and of these 12·7 per cent. were benign tertian, 28·2 quartan and 31·8 malignant tertian. To test the value of this prophylactic measure two of the volunteers, one who had atebrin only and one who had atebrin and plasmoquine, were exposed to the bites of naturally infected mosquitoes after completion of the course. The latter had no symptoms, but the former had moderate headache, pains in limbs and lassitude, but his temperature was always normal. Blood examination showed quartan gametocytes in thick films, but no rings or dividing forms. From his observations the author concludes that atebrin can be taken for several months without toxic effects as a prophylactic against malaria. Plasmoquine is also well tolerated. He considers that the combination is the most suitable method for malaria prophylaxis in countries where malignant tertian malaria frequently occurs. *E. D. W. Greig.*

RUSSELL (Paul F.). **Automatic Distribution of Paris Green for Malaria Control.**—*Jl. Parasitology.* 1933. Mar. Vol. 19. No. 3. pp. 215–224. With 6 figs.

A paralysing lack of money and untrustworthy labour hamper all attempts to control malaria in the tropics. Intelligent laymen have not yet grasped that malaria control must be continued indefinitely, like the repair of roads and the control of water supplies. " All available methods of control should be utilized rather than, as the League of Nations advises, with Europe as a test, that only one or another particular method should be employed in a given place. No single approach to malaria control in the tropics will be more than partially effective. . . . There is no example of effective control in the tropics by measures which did not include an attack on anopheline mosquitoes." Drug prophylaxis, when used alone, is futile and costly. On the other hand there are numerous instances of successful control by anti-mosquito measures : but in most cases these are too costly for general adoption. In an attempt to reduce costs and to dispense with unsatisfactory labour, the author has devised a simple machine which can be fixed over a stream and sprinkles it automatically with Paris green. It consists of a tin hopper of 100 litres capacity which distributes the sand and Paris green mixture at the rate of 180 cc. per minute. It is protected by a small palm-leaf hut. The mixture is 1 per cent. Paris green in sand. Diluents finer than sand cannot be used. The machine can be built for about $25 gold. The Paris green flows out intermittently for about 10 hours. Placed above a shallow stream, two or three yards wide, it caused a pronounced reduction in the numbers of larvae, and the effect was apparent even 300 metres down stream. Other means of automatic distribution are being studied. " Our goal is the construction of a mechanically efficient automatic blower, motivated by the flow of water in the stream under treatment."

W. F.

WALLACE (R. B.). **Paris Green as a Larvicide on an Inland Hilly Estate in Malaya.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. July 28. Vol. 27. No. 2. pp. 131–146. With 4 charts & 6 figs. on 1 plate.

Paris green is of little value as a larvicide in the hilly parts of Malaya, where the stream-breeding *A. maculatus* is the vector of malaria.

The area in which this experiment was made consisted of 10,000 acres of rubber-land situated in the foothills of high ranges ; ravines, streams and drains were numerous and the rainfall was over a hundred inches. The carrier was *A. maculatus*, and most of the breeding places were at the edges of streams, drains and seepages, where there was a distinct flow. Oiling every seven days over a radius of half a mile round all habitations was in force until January 1930 ; from January until October, 1 per cent. Paris green was used instead, in order to reduce costs. The Paris green cost less than the oil, but the breeding places increased in number ; much of the money which was saved by the use of Paris green had to be expended in treating the malaria which followed, and, after 8 months trial, the author reverted to the use of oil. He concluded that Paris green " was not so effective as oil, and was apparently of little value as a larvicide against *A. maculatus*—the dangerous anopheline of inland hilly areas of Malaya, where the breeding places are almost entirely confined to water moving more or less rapidly." Lime, as a diluent, was too irritating to the eyes and throats of the coolies. Talcum was easy to apply but the results were not good. From May onwards, soapstone was tried, but the results were still unsatisfactory [see this *Bulletin*, QUAIFE, Vol. 27, p. 909. Also MANSON and RAMSAY above, p. 820]. *W. F.*

i. TRAUSMILLER (O.). Ueber die Grenzen der Malaria-Bekämpfung mittels Gambusien. [**Limits of Malaria Prevention by Means of Gambusia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 530–539. With 4 figs. [19 refs.]
ii. KALANDADSE (L.) & MTSCHEDLIDSE (J.). Materialien zur Biologie des Fisches Gambusia. [**Biology of Gambusia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1932. Oct. Vol. 36. No. 10. pp. 539–544.

i. The author describes the excellent effect, apart from other measures, of the introduction of Gambusia into two malarious islands in the Adriatic.

SELLA's statement that the use of Gambusia freed a district of Istria from malaria [see this *Bulletin*, Vol. 25, p. 915] was received at the time with scepticism, but Trausmiller has had a similar experience. The islands in question were Krk and Pag which lie close to the Jugoslavian coast. Krk (26,000 inhabitants) contains masses of limestone in which water disappears so that the people are obliged to store rain water. This they do in primitive pools or cemented cisterns usually below the ground. The cisterns were found to be free from Anopheles, which, however, breed in the pools or "lokwas," made wherever a sufficiency of clay overlies the limestone; of these there are some 400, many of which become dry in summer. In August 1924, 200 Gambusias were brought to the island and in 1926 they were present in most of the lokwas; they have now become thoroughly acclimatized. Every owner of a lokwas has to free the water from vegetation as soon as it is 30 cm. above the surface. In 1926 and 1927 this order was well carried out and larvae were seldom found and though the use of quinine was more and more restricted the malaria curve went down. Whereas in 1925 the spleen index of school children was 7·4 to 19·5 per cent., in 1928 it had fallen in the 19·5 area to 2·3. In 1928 the vegetation was neglected but the expected increase of malaria did not result: the Gambusias were so well established that they had penetrated into the thickest vegetation.

In the island of Pag (10,000 inhabitants) malaria is still more prevalent and some of the ground is swampy; in some places the spleen index is 80 to 90 per cent. To sleep in one village was to contract malaria without fail. But the introduction of Gambusia was just as effective as in Krk, though no attempt was made to keep the pools free from vegetation. That the fish were really the cause was shown by the state of the south end of the island which the author had been obliged to neglect, and where Anopheles larvae were as thick as ever

ii. Gambusia were in 1925 introduced from Italy to Abkhasian and Ajaristan. The authors have studied their biology and here give an account of it. An interesting point is that they found it paid to open the pregnant female and rear the fry separately, so many did the mother eat even when other food was at hand. *A. G. B.*

HOLLAND (E. A.). **An Experiment in the Control of Malaria in New Ireland by Distribution of** *Gambusia affinis.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. May 5. Vol. 26. No. 6. pp. 529–538. With 1 map.

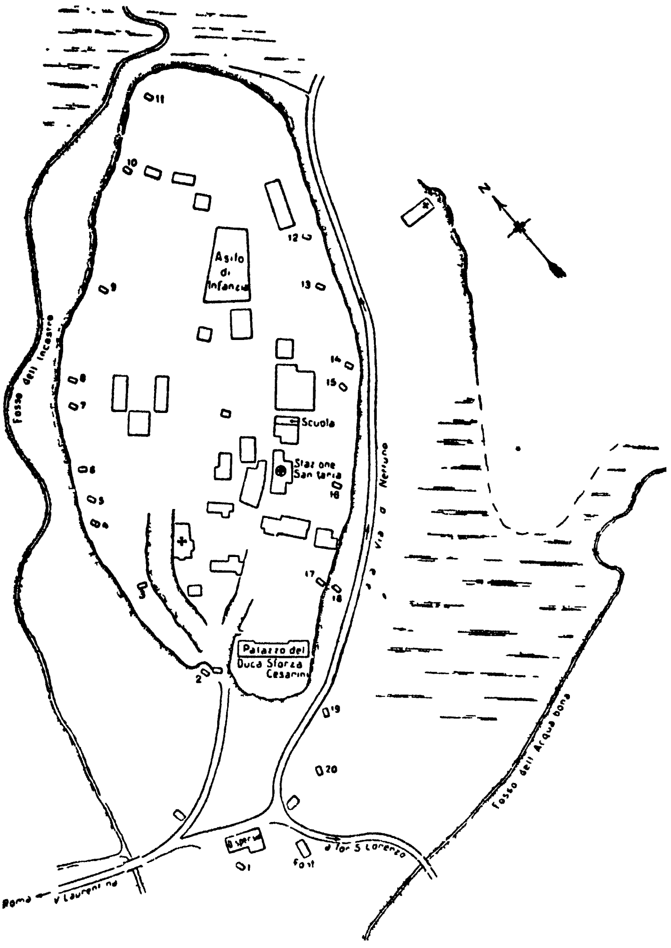
The town of Kavieng was freed from mosquitoes by gambusia. The introduction of gambusia into coast villages affected a great improvement, and reduced the spleen rate from 24·6 to 4·2.

New Ireland is one of the islands of the Bismarck Archipelago administered under a mandate by the Commonwealth of Australia. It is over 200 miles long and in places it is less than 5 miles wide. Kavieng, where the author was stationed, is 160 miles by sea from Rabaul, the capital of the Archipelago. The climate is tropical with little variation in the mean temperature. There are two seasons : the South-East, from November to April which is dry ; the North-West, from May to October, which is wet. Malaria of the tertian and subtertian types is endemic, quartan is unknown. The only anopheles are *A. punctulatus* Dön. which breeds in clear water, and *A. punctulatus* var. *moluccensis* Swell., which breeds in pig-wallows, slimy swamps and puddles, as well as in clear water. Both are vectors. The population of the district is declining from year to year, and the greatest decline is in the places with the highest spleen rates. The author ascribes this decline to malaria rather than to the " clash of cultures," or " loss of will to survive " spoken of by anthropologists. The author's bungalow at Kavieng was made almost uninhabitable owing to swarms of mosquitoes during his first wet season in 1930. Behind the town there was a swamp which could not be effectively drained because it was approximately at sea-level, and the drains cut from it were themselves excellent breeding places. Oiling was tried, but did not prove effective. In February 1931, about 100 *Gambusia affinis* were received from Rabaul. Half were put in the drains, and half in the ponds outside the town. The drains and ponds became alive with gambusia, and " the town was quickly freed of mosquitoes." Following this success in the town, gambusia was introduced into all known breeding places of anopheles over an area of coastal villages 72 miles long, containing 3,000 natives. The spleen rate fell from 24·6 in August 1930, to 16·8 in February 1931, 12·8 in October 1931, and 4·2 in July 1932. In the control, untreated area, among 3,438 natives, the spleen rate in the corresponding months was 47·1, 23·9, 24·7 and 28·8. There was an excess of births over deaths in the treated areas for the first time on record. " Experiments have shown that gambusia can survive when transferred from pond-water to brackish, and then, to sea-water. There is a possibility, then, that the gambusia going down to sea may distribute themselves over the district by entering rivers and swamps." *W. F.*

ESCALAR (G.). Applicazione sperimentale della zooprofilassi in Ardea.' **(Experimental Application of Zooprophylaxis at Ardea (Agro Romano).)**—*Riv. di Malariologia.* 1933. Mar.–Apr. Vol. 12. No. 2. pp. 373–380. With 1 fig. English summary (6 lines) p. 453.

Ardea is a district in the south of Agro Romano, about 4 kilometres from the shore. The permanent residents number some 700, of whom 200 are children up to 10 years of age ; there is also a floating population of about 200. The district measures 700 by 300 metres and till 1932 had a high malarial endemicity ; in 1930 46·7 per cent. and in 1931

32·26 per cent. A barrage of 20 sties was erected in 1932 (the article has a sketch showing the disposition of these) and the map shows a considerable gap between two of them on the north-east aspect.



Sketch map of Ardea showing ring of pigsties erected in 1932 to attract anophelines from the human habitations.

[Reproduced from the *Rivista di Malariologia.*]

The common anophelines of the district are *A. maculipennis*, var. *messeae*, var. *labranchiae* and var. *basilii*, the second predominating. In May to December 1931, there were 4,791 anopheles caught, of which 3,356 or 70 per cent. were from the dwellings; in the same period of 1932, after the barrage had been established, 24,276 were caught, only 2,368 or 9·7 per cent. in the houses.

During the same period there were 87 and 38 cases of malaria. Throughout the whole 12 months of 1932 there were 63 cases, 33 subtertian and 30 benign, among 704 inhabitants, *i.e.*, 8·9 per cent. in place of 32·2 in 1931 and 46·7 in 1930. The number of primary infections in May-December 1931 was 16; in the same period of the following

year, one. This was in September in a child of 9 months, living at the extreme north-east of the district adjacent to the gap referred to above. It is proposed that other sties should be erected to protect this gap.

H H S.

NICKUM (Oliver C) **Malaria transmitted by Hypodermic Syringe.**—*Jl Amer Med Assoc* 1933 May 6 Vol 100 No 18 pp 1401–1402

The author reports a case of benign tertian in a morphia injecter who probably became infected through the agency of a hypodermic syringe which he shared with a man who had formerly suffered from malaria [see BIGGAM, this *Bulletin*, Vol 27, p 202]

W F

AKASHI (Kazuyoshi) **Three Genuine Cases of Malarial Polyneuritis.**—*Taiwan Igakkai Zasshi* (*Jl Med Assoc Formosa*) 1933 Apr Vol 32 No 4 (337) [In Japanese English summary p 49]

Reports 3 cases in which paralytic symptoms resembling acute beriberi appeared either with the onset of an attack of subtertian malaria, or a few days later

W F

SPAAR (Eric C) **The Treatment of Malaria in Ceylon with Plasmoquine-Quinine Compounds. A Critical Study of 50 Cases.**—*Jl Trop Med & Hyg* 1933 June 1 Vol 36 No 11 pp 158–164 With 2 charts

Twenty-five patients were given 0 03 gm of plasmoquine and 15 grains of quinine daily, for 7 days or longer A second series of 25 was given 0 06 gm of plasmoquine and 12 grains of quinine daily toxic phenomena were decidedly noticed in two cases of this series The author found the first treatment safer than the second and quite as effective

W F

DE MELLO (Froilano) BRAS DE SÁ (L J) & D AZEVEDO (António) Contribution à l'étude de l action plasmodicide de l atébrine **(Contribution to the Study of the Effect of Atebrin on Plasmodies** [*sic*])—*Riv di Malariologia* 1932 Vol 11 No 6 pp 808–824 English summary p 940

The authors give the details of 19 cases treated with atebrin The results were excellent and confirm those obtained by other workers They conclude that its action upon the fever is equal, if not superior, to that of quinine

W F

EPSTEIN (David) **The Action of Plasmoquine on the Uterus.**—*Quarterly Jl Pharm & Pharmacol* 1933 Jan–Mar Vol 6 No 1 pp 5–12 With 3 figs

A fuller version of a paper published in 1931, see this *Bulletin*, Vol 28, p 848

A G B

D'ALESSANDRIA (Eduardo) La formola leucocitometrica nella malaria tropicale —*Giorn Ital di Malat Esot e Trop* 1933 Aug 31 Vol 6 No 8 pp 209–212, 215 [17 refs]

BAKER (J N) Malaria Control in Alabama in 1932 —*Southern Med Jl* 1933 May Vol 26 No 5 p 469

BASU (B. C.). Report on a Brief Survey of Malaria and Anophelines in Patna.—Records of the Malaria Survey of India 1933 June Vol 3 No 3 pp 577–578

BISHOP (E L) Malaria Control in Tennessee, July 1, 1931–June 30, 1932—*Southern Med Jl* 1933 May Vol 26 No 5 pp 472–473

BROWNE (W T) Malaria Control in Louisiana in 1932—*Southern Med Jl* 1933 May Vol 26 No 5 pp 471–472

CARTAÑÁ CASTELLÁ (P), CANICIO GARCIA (I) & FABREGA HUGA (J) Resumen de la campaña anti-palúdica realizada en el Delta del Ebro desde el año 1925 al 1932, ambos inclusive—*Rev San e Hig Públıca* 1933 Aug Vol 8 No 8 pp 113–165 With 1 map, 3 figs & 7 diagrams

CLARKSON (L M) Malaria Control in Georgia by Convict Labor—*Southern Med Jl* 1933 May Vol 26 No 5 pp 461–464

COLLARI (Salvatore) Malaria e tubercolosi La malarioterapia nella tubercolosi polmonare—*Lotta c la Tubercolosi* 1933 Apr Vol 4 No 4 pp 360–376 With 7 figs English summary (9 lines) [22 refs]

DAVID (J) Traitement du paludisme par l'atebrine—*Harefuah* Jerusalem 1933 Mar-Apr Vol 7 No 2 pp 55–57 [In Hebrew French summary p 1]

DAWSON (W T) Sources of Remedies for Malaria—*Southern Med Jl* 1933 May Vol 26 No 5 pp 453–454

DELACOUX DES ROSEAUX Sur un cas d'intoxication par la quinine—*Bull Soc Path Exot* 1933 Apr 5 Vol 26 No 4 pp 614–616

DEL CAMPO CARDONA (A) & PITA GANDARIAS (Eusebio) Nota sobre la lucha antipalúdica en la provincia de Cáceres (años 1921–1932)—*Rev San e Hig Pública* 1933 June Vol 8 No 6 pp 553–587 With 8 charts

DIAZ FLOREZ (A), GARCIA DE COSA (C), CASAS (U) & ORTEGA (David) Ensayos sobre la acción inmediata del nuevo preparado " Atebrin Bayer " contra el paludismo—*Rev San e Hig Pública* 1933 Aug Vol 8 No 8 pp 182–185.

EJERCITO (Antonio) Malaria Studies in the Philippines Part I General Considerations Regarding Malaria as a Widespread Disease Occurrence of Malaria with Other Diseases, Urban Malaria, Rural Malaria, and Malaria as an Important Problem—*Monthly Bull Philippine Health Serv* 1932 Dec Vol 12 No 12 pp 675–688 [11 refs]

FATOME Paludisme et urticaire—*Arch Méd et Pharm Nav* 1933 Apr-May-June Vol 123 No 2 pp 301–303

FAUST (Ernest Carroll) Malaria Mortality in the Southern United States, 1931—*Southern Med Jl* 1933 May Vol 26 No 5 pp 454–455

FRÓES (Heitor Praguer) Malaria comatosa (Comatose Malaria)—*Riv di Malariologia* 1933 Jan-Feb Vol 12 No 1 pp 108–114 English summary p 260

GALLIARD (Henri) Remarques sur une étude épidemiologique du paludisme effectuee en Corse, dans la région de Figari—*Rev Méd et Hyg Trop* 1933 Mar-Apr Vol 25 No 2 pp 100–102

GARRISON (C W) Malaria Control in Arkansas in 1932—*Southern Med Jl* 1933 May Vol 26 No 5 pp 469–470

GRENIERBOLEY (Jean) & NAY-HUOTH Sur le traitement des splénomégalies palustres par l'adrénaline en injections sous-cutanées—*Rev Méd et Hyg Trop* 1933 May-June Vol 25 No 3 pp 157–160

HANSON (Henry) Malaria Control in Florida in 1932—*Southern Med Jl* 1933 May Vol 26 No 5 p 471

HEGNER (Robert) Sir Ronald Ross and the Discovery of the Mosquito Transmission of Malaria—*Jl Parasitology* 1933 June Vol 19 No 4. pp 312–313

HENRY (A) Les causes d'erreurs dans la pratique de la mélanofloculation—*Bull Soc Path Exot* 1933 July 12 Vol 26 No 7 pp 914–919

JOHN (Hanns) & GLOWAZKY (Franz) Die Wirkung einiger Chinolin-Derivate bei der Vogelmalaria—*Ztschr f Immunitätsf u Experim Therap* 1933. Vol 78 No 3/4. pp 280–283

JOHNSON (W Scott) Malaria Control in Missouri in 1932 —*Southern Med Jl.* 1933 May Vol 26 No 5 p 472

KOMP (W H W) Additional Notes on the Preparation and Examination of Thick Blood Films for Malaria Diagnosis —*Public Health Rep* 1933. July 28 Vol 48 No 30 pp 875–884

LEFÈBVRE Notes sur le paludisme au 5e territoire militaire du Tonkin —*Bull Soc Méd -Chirurg Indochine* 1933 Mar -Apr Vol. 11 No 2 pp 151–159 With 1 folding map.

LEGENDRE (F) Note sur l'état actuel de l'endémicité palustre à Tamatave —*Bull Soc Path Exot* 1933 June 14 Vol 26 No 6 pp 875–879

LEGENDRE (F) Rapport sur l'état actuel de l'endémie palustre à Fianarantsoa —*Bull Soc Path Exot* 1933 June 14 Vol 26 No 6 pp 884-888.

McGINNES (G Foard) Malaria Control in Virginia in 1932 —*Southern Med Jl* 1933 May Vol 26 No 5 p 473.

McQUEEN (W B) The Non-Toxicity of Plasmochin and Atebrin —*Indian Med Gaz* 1933 June Vol 68 No 6 p 323.

MAROTTA (G) & PERATONER (U) L'atebrin nella cura delle febbri di malaria —*Policlinico* Sez Prat 1933 July 31 Vol 40 No 31 pp 1205–1207 With 3 charts

MERCIER Notes sur les résultats obtenus dans le traitement du paludisme par l emploi de la quinoplasmine —*Ann de Méd et de Pharm Colon* 1932 Oct -Nov -Dec Vol 30 No 4 pp 635–653

MOLLOW (W) Ueber Atebrin und Atebrin-Plasmochin in der Therapie der Malaria —*Arch f Schiffs- u Trop -Hyg* 1933 June Vol 37 No 6 pp 291–294

PECORI (G) & ESCALAR (G) Relazione sulla campagna antimalarica nell'Agro Romano durante l'anno 1931 (Report of the Antimalarial Campaign in the Agro Romano for 1931)—*Riv di Malariologia* 1932 Sept -Oct Vol 11 No 5 pp 615–675 With 1 map, 2 graphs & 12 figs English summary p 751

PERATONER (Ugo) Del metodo di arricchimento nella malaria in rapporto allo studio del parassita (The Enrichment Method for the Study of the Malarial Parasites)—*Riv di Malariologia* 1932 Sept -Oct Vol 11 No 5 pp 676–681 [11 refs] English summary (3 lines) p 751

PINTO (Genserico de Souza) A malaria no sul de Minas Geraes —*Folha Med.* 1933 Apr 15 Vol 14 No 11 pp 170–174

POTT (W H) Haematuria—Malarial —*Chinese Med. Jl* 1933 Apr Vol 47. No 4 pp 397–398

RECTOR (Nelson H) Minor Drainage in the Delta Section of Mississippi —*Southern Med Jl* 1933 May Vol 26 No 5 pp 458–461

RILEY (George E) Malaria Control in Mississippi in 1932 —*Southern Med Jl* 1933 May Vol 26 No 5 p 472

RUGE (H) Ueber Uebertragbarkeit der Impfmalaria durch Anopheles Bemerkungen zu der gleichnamigen Arbeit von Wichels und Maas, Jg 1933, Nr 19, S 744 dieser Wochenschrift —*Klin Woch* 1933 July 15 Vol 12 No 28 pp 1101–1102

SCHWARTZ (M) Treatment of Malaria by Plasmoquine and Quinine —*Brit Med. Jl* 1933 June 10 pp 995–996

SCHWETZ (J) Notes sur le paludisme au Congo (Notes on Malaria in Congo)—*Riv di Malariologia* 1933 May–June Vol 12 No 3 pp 540–546 [18 refs] English summary p 653

SCHWETZ (J), BAUMANN (H), PEEL & DROESHAUT Notes malarialogiques sur la répartition de trois espèces malariennes, suivant l'âge, chez les noirs de l'Afrique Centrale —*Ann Soc Belge de Méd Trop* 1933 Mar 31 Vol 13 No 1 pp 49–63 [See this *Bulletin*, Vol 30, p 469]

SERGENT (Etienne) Les conditions du paludisme dans la banlieue sud-est de Maison-Carrée (Dt d'Alger) —*Arch Inst Pasteur d'Algérie* 1933 June Vol 11 No 2 pp 208–214 With 1 map & 7 figs on 5 plates

Sicart (Marcel). Contribution à l'étude de l'atébrine Dix observations.—*Tunisie Méd.* 1933 Mar. Vol. 27. No. 3. pp. 103–112. With 1 text fig. [41 refs.]

Singh (S. A. S. Jaswant). Some Observations on the Mosquitoes and Sandflies of Rajputana.—*Records of the Malaria Survey of India.* 1933. June. Vol. 3 No. 3. pp 579–581

Sinton (J. A). Rice Cultivation in Spain, with Special Reference to the Conditions in the Delta of the River Ebro —*Records of the Malaria Survey of India* 1933. June Vol. 3. No 3 pp. 495–506.

Sliwensky (M) Atebrin-Prophylaxe im Jagdschloss Kritischim in Bulgarien.—*Arch. f Schiffs- u Trop -Hyg* 1933 Aug Vol 37. No 8. pp 389–391.

Sur (S N), **Bhattacharji** (K P) & **Khan** (B. M). Report on a Malaria Survey in Kalimpong and Sikkim —*Records of the Malaria Survey of India* 1933. June. Vol 3. No 3 pp 571–575.

Taddia (Leo) Le gambusie nella lotta antimalarica —*Arch Ital Sci Med. Colon.* 1933. July 1 Vol. 14 No 7 pp 422–429 English summary (4 lines).

Tegoni (G) in collaboration with B Williams **Aureli** Indice bibliografico della malaria —Supplement to *Riv di Malariologia.* 1933. Vol 12. 122 pp.

A CENTRAL MALARIA LIBRARY IN ROME.—A malaria library was founded in Rome by the Stazione Sperimentale per la Lotta Antimalarica in 1925, and an index to malarial literature is issued annually by the station. To make the library as complete as possible all malariologists are asked to send books, reports, and articles on malaria to it, and photostat copies of any article in the library may be had for the cost of reproduction. All publications and inquiries should be addressed to the director of the station, Corso Vittorio Emanuele 168, Rome (16).

TYPHUS AND UNCLASSED FEVERS.

NICOLLE (Ch.). Unité ou pluralité des typhus. (Rapport introductif.) [**Unity or Plurality of the Typhus Fevers.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 316–340.

This interesting discussion on typhus fever, epidemic and endemic, was opened by Professor Charles Nicolle who supported the view that the viruses of these diseases were separate and distinct, whereas Professor LÉPINE who followed took the view that they were one and the same.

Professor BRUMPT, who was in the chair, objected to the term "typhus historique" employed by Nicolle as likely further to complicate a complicated nomenclature. Unfortunately Nicolle was unable to be present owing to illness but M. MESNIL replied for him that the term "typhus exanthematique" included epidemic and endemic typhus and Nicolle used "historique" to describe the first and "murin" for the second, *i.e.*, Brill's disease.

Most of the details of Nicolle's thesis have already been published. He relies principally on the difference in the action on guineapigs and rats to distinguish the viruses, also the high mortality in man with epidemic typhus and the difference in action on lice. LÉPINE on the other hand pointed out that although at first the virus of rat typhus produces fever and scrotal reaction in experimental animals, after passage this reaction ceases to appear and later no difference can be noted between the two viruses. As regards the action on lice both LÉPINE and BRUMPT pointed out that Nicolle was relying on WEIGL's method of inoculation *per anum*, which is certainly not a natural mode of infection and if lice are infected by feeding on a patient or on an infected monkey the rapid destruction of the lice does not occur and lice fed on a typhus patient live the same time as those fed on a patient suffering from Brill's disease.

As regards crossed immunity experiments it is interesting to note that both sides claimed results supporting their own view of the case. LÉPINE quoted an interesting series of experiments in which he inoculated a number of guineapigs with typhus virus; after they had reacted they were inoculated with the virus of endemic typhus with the following result:—

50 per cent. showed no reaction, immune;
40 per cent. showed a mild attenuated reaction;
10 per cent. a moderate reaction;

but none so severe as in the controls. When a similar series of guineapigs were reinoculated with the homologous virus exactly the same result was obtained. Nicolle on the other hand relied on his work (summarized recently) in which he used 3 viruses, Mexican, Tangiers and Toulon, the African virus being true typhus, and claimed that differences in immunizing power were shown.

The other exanthematous fevers such as fièvre boutonneuse, Rocky Mountain fever and Japanese River fever, were briefly referred to but were considered to be sharply separated from true typhus by the differences in the Weil-Felix reaction and the fact that they are carried by ticks and mites and not by lice or fleas. BRUMPT pointed out that recently WEIGL had succeeded in passing the virus of Rocky Mountain spotted fever through several generations of lice and that this passage had in no way altered the action of the virus on guineapigs. LÉPINE gave details of a recent epidemic of 50 cases of typhus in the city of Drama in which he considered that the first two or three cases were flea-borne and these gave rise to the small epidemic which was louse-borne ; on the other hand Nicolle found that in the mines in Algeria where everyone was subject to the bites of fleas only the men who were infested with lice developed typhus. *D. Harvey.*

NICOLLE (Charles). Unité ou pluralité des typhus exanthématiques, (à propos de la discussion de mon rapport à la séance du 9 février). **[Unity or Plurality of Typhus Viruses.]**—*Bull. Soc. Path. Exot.* 1933. Mar. 8. Vol. 26. No. 3. pp. 375–376.

Professor Nicolle was unfortunately unable to be present at the recent discussion on this subject owing to ill health. He now replies to some criticisms of his paper which was read on that occasion.

He maintains that there are many small points of difference between the typhus viruses (endemic and epidemic) but he insisted in his paper on one only of the most importance—that is the difference in action of the viruses on the rat. The virus of epidemic typhus is maintained in the rat with difficulty (3 generations at most), whereas the virus of endemic typhus can be maintained indefinitely in rats and mice ; this virus also is capable of passing through the alimentary mucous membrane of rats, not so the epidemic virus. Nicolle believes that there are several endemic viruses ; hence his use of the plural (typhus murins). *D. H.*

MEGAW (John). **A Note on Professor Nicolle's Views on the Typhus and Relapsing Fevers.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 462–464.

General Megaw refers to a recent paper by Professor NICOLLE in which he proposes the names of "historical typhus" and "murine typhus" for epidemic and endemic typhus; Megaw considers that the confusion in the nomenclature of the typhus diseases is not likely to be lessened by NICOLLE's proposals, and refers to his own original suggestion to employ the name of the insect vector, where that is known. In view of recent discoveries it is now necessary to add to louse, tick and mite typhus a special group for flea typhus *D. H.*

LEMAIRE (G.). Sur la dénomination de "fièvre exanthématique." **[The Name "Fièvre Exanthématique."]**—*Bull. Soc. Path. Exot.* 1932. Nov. 9. Vol. 25. No. 9. pp. 934–935.

The author cites the conclusions of a Commission consisting of Professors NICOLLE, OLMER, JORGE, COMBIESCO, MARCANDIER and PLAZY who recently (October, 1932) decided that the term exanthematous fever should be applied to the group of typhus-like fevers and that "Marseilles fever" should be called fièvre boutonneuse and should be included in the group. Lemaire considers the term *boutonneuse* to be a misnomer as regards the eruption and objects to this fever being included in the group of typhus-like fevers. He contends that "fièvre boutonneuse" can be readily distinguished on clinical grounds from typhus or Brill's disease. [Possibly this may be so but on the other hand it would be difficult to separate a case of fièvre boutonneuse of moderate severity from a similar type of case of tick fever, tropical typhus, Japanese River fever or Rocky Mountain fever on clinical grounds alone.] *D. H.*

JORGE (Ricardo). La famille typho-exanthématique. **[The Typhus Group of Fevers.]**—*Bull. Office Internat. d'Hyg. Publique.* 1933. Feb. Vol. 25. No. 2. pp. 289–304. [Refs. in footnotes.]

Dr. Jorge, who first reported the occurrence of fièvre boutonneuse, or as he originally called it " fièvre escharonodulaire," in Portugal, renders a report on the general subject of the typhus group of fevers to the International Office of Public Hygiene in Paris.

The first part is concerned with typhus major and minor, or in other words epidemic and endemic typhus. Dr. Jorge makes the interesting commentary that in the year 1546 the Italian physician FRACASTOR described typhus fever under the term febris peticularis and that in the same century the common name for the disease in Portugal and Spain was " tabardillo " and that both the name and the disease were transported to Mexico by the explorers of that period.

Dr. Jorge then deals at some length with the subject of fièvre boutonneuse, the name which has been recommended for the disease by the Congress recently held in Marseilles. This Congress also proposed that the term exanthematous fevers should be utilized for the group of typhus-like fevers. Dr. Jorge notes that the term eruptive fever is still employed by English writers. *D. H.*

TOOMEY (Noxon). **The Typhus-Spotted Fever Group.**—*Ann. Intern. Med.* 1932. Oct. Vol. 6. No. 4. pp. 542–562.

This paper is a summary of knowledge concerning the typhus group of diseases or typhus-spotted fever group as the author terms it. As he points out, many of the less known fevers of the group which are included under local names in his tables will eventually fall into one or other of the better known categories, louse-borne, tick-borne or flea borne typhus, when they have been investigated on the lines of research followed in the case of endemic typhus in America and " fièvre boutonneuse " in Europe and Africa.

The paper contains two very useful tables, the first being a chronological record of the principal discoveries in this group of diseases from 1902 to 1932 inclusive. The second table places the diseases under the known vectors, with the seasonal variation, incubation period, presence or absence of primary sore, and the chief clinical symptoms so far as these are known. [" Ship typhus " is included under the mite-borne diseases, but the " ship typhus " of Toulon has been definitely shown to be endemic typhus carried by rat fleas. In another place " endemic typhus " is referred to as " spotted fever of eastern type " which is liable to cause confusion.]

The author points out that the comparative symptomatology of the diseases of the typhus-spotted fever group can be correlated in a general way with the vectors implicated. Thus a primary sore at site of inoculation is not observed in louse-borne or flea-borne typhus, is met with in some but not in all of the tick-borne diseases, and is virtually a constant feature in the mite-borne diseases.

Secondary lymphangitis is not met with in louse-borne or flea-borne diseases and is rare in tick-borne disease but practically constant in the mite-borne diseases ; yet even in these last some differences can be noted ; thus in Japanese River fever the local reaction is severe and the lymphangitis slight, whereas in pseudo-typhus of Sumatra the local reaction is slight and the lymphangitis is severe. As regards the rashes met with in these fevers, if a large number of cases of each type is studied certain broad distinctions can be made out. Thus in the louse-borne and flea-borne type in the Mexican fevers the rash is less papular, is larger and distributed more on the lower part of the body than in the classical typhus of Europe; in the same way endemic typhus can be distinguished from old world typhus, as the rash is a somewhat smaller lenticular lesion with less tendency to become petechial. In the tick-borne diseases Rocky Mountain fever shows a marked passive congestion and the rash appears first on the wrists and ankles spreading upwards as oedematous macules, usually sparing the face. In "fièvre boutonneuse" the rash is much more papular and appears first on the face or upper parts of the trunk. In the mite-borne diseases the rash is much the same in all.

The bacteriological evidence, such as crossed immunity tests and Weil-Felix reactions, also tends to divide the same main groups, louse- and flea-borne types, tick-borne types, and mite-borne types. *D. H.*

TOOMEY (Noxon). **A Sporadic Benign Rickettsial Fever with Occasional Exanthem.**—*Ann. Intern. Med.* 1933. Jan. Vol. 6. No. 7, pp. 921–940. With 2 charts. [30 refs.]

An intensely febrile disease of short duration (3 to 4 days fever, intermission for one or two days and a secondary rise on the 6th or 7th day) was observed to cause a sharply localized group of cases in Illinois during early August 1932.

Of the eleven cases described 10 were without rash; in the other case there developed an ascending macular rash somewhat resembling that of a mild case of Rocky Mountain fever but disappearing suddenly with the lysis of the fever. Although the disease was probably insect-borne a primary sore at site of inoculation was not observed. The vector was not identified but there was a history in two cases suggesting that the virus was transmitted by an hymenopteron of the genus *Halictus* locally known as "sweat bees." Agglutination tests against strains of Proteus X-organisms showed an affinity for the non-indologenic strain XK in addition to slight agglutination of X 19 strains. Guineapigs were moderately susceptible to the virus; the reaction was without a noticeable scrotal lesion, thus resembling the reaction following inoculation of epidemic typhus rather than that of Rocky Mountain fever or endemic typhus virus. Rickettsia were found in smears made from the tunica of guineapigs during the fever resulting from inoculation of the blood of the cases.

[It is of interest to note that the blood of patients taken on the 9th day of the disease, *i.e.*, 2 or 3 days after the fever had ceased, was infective for guineapigs, also that blood taken on the 20th day from the onset was still virulent.]

Guineapigs which had recovered from fever due to inoculation of patients' blood were found to be susceptible to inoculation with the virus of Rocky Mountain fever but they appeared to have a partial or group immunity to this virus as compared with normal control animals; they showed no immunity to the virus of endemic typhus. *D. H.*

DYER (R. E.), BADGER (L. F.), CEDER (E. T.) & WORKMAN (W. G.). **Endemic Typhus Fever of the United States: History, Epidemiology and Mode of Transmission.**—*Jl. Amer. Med. Assoc.* 1932. Sept. 3. Vol. 99. No. 10. pp. 795–800. [75 refs.]

This is a very complete review of the literature of endemic typhus of the United States and is prefaced by references to the early work of

MURCHISON, CARTER, NICOLLE and RICKETTS and others on epidemic typhus. The later papers mentioned have all been reviewed in recent numbers of this *Bulletin.*

"From the foregoing facts, it would appear definitely established that the disease typhus has two manifestations known at present: the first and better known, a louse-borne disease of great communicability from person to person in times of overcrowding of unclean populations and characterized by its tendency to the formation of epidemics; the second, a disease primarily of rodents which is apparently transmitted from rat to man by rat fleas. This manifestation of typhus seemingly is not transmitted from man to man and is therefore characterized by the tendency to remain endemic." *D. H.*

DYER (R. E.), WORKMAN (W. G.) & RUMREICH (A.). **Endemic Typhus Fever Virus recovered from Wild Rat trapped at Typhus Focus in the United States.**—*Public Health Rep.* 1932. Dec. 30. Vol. 47. No. 53. pp. 2370–2372.

Dyer and his co-workers refer to their previous reports of the recovery of the virus of endemic typhus from rats in an endemic area (Savannah). The purpose of the present communication is to set out this work in greater detail by means of tables.

Of 481 guineapigs inoculated in the course of the work 30 died of intercurrent infections and 85 per cent. of the survivors showed the typical scrotal reaction. *D. H.*

BABLET (J.) Résultats des recherches poursuivies sur les fièvres exanthématiques en Indochine depuis 1908. [**Typhus Fevers in Indo-China since 1908.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8. & 9. Vol. 26. No. 2. pp. 340–345. [12 refs]

Typhus fever (louse borne) was first described in 1908 in Indo-China by YERSIN; the rash in natives was either slight or non-existent. In 1921 a small epidemic occurred in the jail in Hanoi, the Weil-Felix reaction being strongly positive. Since 1926 it has been established that there are two if not three types of typhus, one carried by lice and one by fleas, Weil-Felix reaction X19 positive, and a third form in which the serum of the patient agglutinates Proteus XK. Cases of tsutsugamushi fever have also been diagnosed. *D. H.*

GAJDOS (Stephen) & TCHANG (Joseph). **Researches concerning Typhus in North China.**—*Chinese Med. Jl.* 1933. May. Vol. 47. No. 5. pp. 441–451. [13 refs.]

True louse-borne typhus is very common in N. China, due to overcrowding in insanitary dwellings and heavy infestation with lice. Reliable statistics of the numbers of cases or of deaths in the native community do not exist; but in the case of one of the local missionary societies it has been ascertained that of 112 deaths in the last 20 years 84 were due to typhus.

In 1931 the authors took up the study of the local typhus virus. They obtained a supply of vaccine from Professor WEIGL of Lwow and have inoculated 230 of the missionary staff and although these people have been exposed to infection for two typhus seasons none so far has developed typhus. Three doses of the vaccine were given in each case. The authors have isolated the virus in guineapigs (17 strains) and the interesting point is that this virus gives rise to fever and marked scrotal swelling in guineapigs, that is to say the same reaction as is given by the Mexican typhus virus and differing from that of the Old World typhus virus. Lice were also infected by the anal route with emulsion of guineapig brain and Rickettsia developed in the cells lining the gut and the gut contents were proved to be infective for guineapigs.

D. H.

MARCANDIER & PIROT (R.). Typhus murin et sodoku chez le cobaye infecté expérimentalement. [**Rat Typhus and Rat-Bite Fever in the Guineapig.**]—*Bull. Soc. Path. Exot* 1933 Jan. 11. Vol. 26. No. 1. pp. 32–46. With 5 charts.

The authors point out that errors may arise in experimental work on typhus due to double infections in wild rats and experimental animals. In the present paper they show that wild rats may harbour the virus of sodoku or rat bite fever, *Spirillum muris*, as well as the virus of typhus. In guineapigs infected with *S. muris* fever results and also a swelling of the genitals; other symptoms are blepharitis, increased sensitivity of the skin and a double inguinal adenitis. This condition differs from that following injection with typhus virus because the incubation period is longer and the genital swelling appears later; it consists of a thickening of the integument which persists for many days and ultimately leads to atrophy of the testicle; the causal organism, *S. muris*, may be demonstrated in the blood and peritoneal fluid and also in fluid drawn off from the swollen genitals. In all typhus work in which wild rats and guineapigs are employed the possibility of infection with *S. muris* should be kept in mind. *D. H.*

LE CHUITON (F.) & MOUREAU (M.). De la nécessité d'une observation prolongée pour affirmer le typhus murin. [**The Need for Prolonged Observation before diagnosing Murine Typhus.**]—*C. R. Soc. Biol.* 1933. Apr. 27. Vol. 112. No. 14. pp. 1378–1379.

In some of the guineapigs inoculated with a virus from rats in Bordeaux fever continued irregularly for 2 to 3 months, which is unusual after inoculation with typhus virus.

In the fluid drawn from the swollen scrotum in these animals spirilla were observed, and the authors considered that there was a mixed infection of the endemic typhus virus and the virus of sodoku (*Spirillum morsus muris*). But when these animals were later tested with typhus virus it was found that they were not immune. The conclusion is that the virus isolated from the rats was that of sodoku or rat-bite fever, which produces prolonged irregular fever with testicular reaction in guineapigs and not typhus virus. *D. H.*

MARCANDIER & PIROT (R.). Acquisitions récentes dans l'étude épidémiologique et expérimentale du typhus murin à Toulon. [**Epidemiological and Experimental Study of Murine Typhus at Toulon.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 349–354.

This paper gives a summary of the history of endemic typhus in the ships of war in Toulon harbour. In 7 years 135 cases have been diagnosed.

Most of the cases occurred in July, August and September but a few in November and December and one or two in January. Infection in all cases was acquired on board ship, in none among the shore establishments. As many as 64 per cent. of rats were found to be infected on board the cruiser *Paris* at the height of the epidemic on that ship; no infected rats were found on ships in which cases had not occurred. The virus of typhus has been proved by injection into guineapigs to be present in the urine of wild rats. *D. H.*

KODAMA (Makoto). **On the Existence of "Manchurian Fever" in Honshu, Japan. (Confirmation of the Study of Dr. R. Matsubara.)**—*Kitasato Arch. Experim. Med.* 1933. July. Vol. 10. No. 3. pp. 190–195.

Endemic typhus has now been found to occur in Japan. Dr. MATSUBARA of Honshu sent some of the virus (guineapig blood) to the author; he has compared it with the local endemic virus in Manchuria and found them to be identical as regards their action on guineapigs, rats and rabbits. *D. H.*

NICOLLE (Charles) & LAIGRET (Jean). L'épreuve des immunités croisées dans les différents typhus (avec quelques considérations sur le mauvais emploi que l'on fait parfois de cette méthode). **[Crossed Immunity Test in the Different Forms of Typhus. Sources of Error.]**—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 251–270.

The authors report in this paper the results of an elaborate series of experiments on crossed immunity tests with typhus viruses. They point out that errors may arise in such work if the following precautions are not observed and careful preliminary tests carried out.

1. If the test inoculation is given immediately at the end of the fever due to the first inoculation.
2. If the original virus is still present in the test animals ("premunition").
3. If the first inoculation is given at too late a date and immunity may have passed off.
4. If the possible occurrence of inapparent infections is not kept in mind.

In many diseases, among which tubercle, relapsing fever and typhus may be included, the germ of the disease may remain active in the body long after apparent recovery has taken place. Nicolle and others have shown that in the case of endemic typhus the virus can be demonstrated in the brain of rats (60 days) and guineapigs (40 days) after the fever has ceased. SERGENT has described this period as the period of premunition, and Nicolle considered that animals should not be employed for crossed immunity experiments during this period, since, presumably, as long as the germ remains active in the body immunity should be present in the majority of cases for the homologous and closely related viruses; as will be seen later this view proved to be incorrect.

A series of preliminary investigations was carried out to arrive at the optimum time for administration of the test dose and it was found that from 1 to 3 months after the initial reaction was the time of election. Three strains of virus were employed in the experiments :—

(*a*) Tunis strain of human louse-borne typhus.

(*b*) A strain of endemic typhus virus isolated from rats in Mexico.

(*c*) A strain of endemic typhus virus isolated from rats on a ship in Toulon Harbour.

Details of Experimental Results. Homologous Viruses.—The African human virus protects against itself when tested 3 months after the first reaction (*i.e.*, outside the period of premunition) 3 times out of 4 trials.

The Mexican rat virus showed itself less active against its own virus ; out of 9 test animals (1 to 4 months), 3 became infected. The resistance was greatest at the 1st month. (Premunition ?).

The Toulon rat virus was the most active as a homologous vaccine. 2 infected out of 11 tested.

Crossed Immunity, Heterologous.—The human African virus protected in more than half the cases against the Mexican rat virus, 11 out of 20 tests ; yet 4 times out of 5 in animals tested in the period of premunition it failed to protect when according to theory immunity should have been highest. The human African virus when tested against the Toulon rat virus gave similar results to the above ; again, in 3 cases out of 5 tested in the 1st month there was failure to protect.

The Mexican rat virus gave very solid protection against the human African virus, 9 guineapigs out of 9 protected. The Toulon rat virus gave a similar result against the human virus. The Mexican rat virus against the Toulon rat virus, 8 protected out of 8 tested. But the Toulon rat virus was less active against the Mexican rat virus—4 out of 10 failure to protect.

Reflexions.—Nicolle remarks that possibly too much has been made of the influence of the condition of " premunition " and that, as will be noted, he employed animals in his experiments at the end of one month after the fever when it was probable that the germ was still present in the brain, and a number of these animals were proved to be susceptible; especially was this the case when heterologous strains were used as test.

The general conclusions are that the tests carried out show that these 3 viruses are closely related and vaccinate the one against the other ; yet as is shown in the detailed list there are distinctions ; thus the rat viruses protect guineapigs against the human virus better than this virus does against itself. Also there is apparently no difference in the results if the animals are inoculated during the period of premunition or later on, say after 3 months. *D. H.*

Lawton (F. Blois) & Murray (Alan). **Endemic Typhus (Brill's Disease).**—*Med. Jl. Australia.* 1933. June 24. 20th Year. Vol. 1. No. 25. pp. 773–774. With 1 fig.

A description of a case of endemic typhus in Melbourne, Victoria. The patient had recently returned from Sydney, N.S.W., where other cases had occurred and where he probably became infected. The fever was severe, lasting about 18 days with delirium and a maculopapular rash on the abdomen. Blood culture was sterile and the serum gave a negative reaction with typhoid, paratyphoid and *Br.*

abortus but later the serum agglutinated Proteus X19 in a dilution of 1/320 and the Warsaw strain 1/1,000, whereas there were no agglutinins for XK. *D. H.*

DES ESSARTS (J. Quérangal) & PRADE (J. V.). Un cas de fièvre exanthématique observé à Brest. [**Case of Typhus at Brest.**]—*Arch. Méd. et Pharm. Nav.* 1932. Apr.–May–June. Vol. 122. No. 2. pp. 140–146.

The authors consider this case to be similar to the cases of endemic typhus (Brill's disease) which had occurred in the same ship in Toulon harbour six months previously. The interesting points about this case are :—

(1) There was a small primary ulcer or " tache noire."

(2) A very marked positive Weil-Felix reaction with the " Metz " strain of Proteus X19 1/12,000 dilution. Negative reaction with the Polish strain.

(3) The case developed on board ship 6 months after the last case ; no other cases on ship or on shore at Brest.

The blood of the patient inoculated into guineapigs gave no reaction. Rat fleas were collected on the ship and emulsified and injected into guineapigs but without result. *D. H.*

NICOLLE (Ch.) & LAIGRET (J.). A propos de la bactérie habituée de la tunique vaginale des cobayes et des rats. [**The Organism of the Tunica Vaginalis of Guineapigs and Rats.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 271–272.

The authors refer to their previous communication [this *Bulletin*, Vol. 29, p. 775] in which they showed that if guineapigs are inoculated with an emulsion of the brain of normal animals or with certain inorganic salts small bodies resembling Rickettsia appear in the tunica. They did not suggest that these bodies were Rickettsia or had any relation to the virus of typhus but that the possibility of their appearance should be kept in mind ; otherwise erroneous conclusions might be formed. *D. H.*

NICOLLE (Charles), LAIGRET (J.) & GIROUD (P.). Passage des virus des fièvres exanthématiques par la voie digestive chez le rat. [**Passage of Typhus Viruses through the Digestive Tract.**]—*C. R. Acad. Sci.* 1933. Jan. 23. Vol. 196. No. 4. pp. 225–227.

The authors suggest that the virus of typhus may be conveyed from rat to rat when a sick rat is devoured by its neighbours or a rat swallows its own or another's ectoparasites.

Four strains of virus were employed in the present series of experiments :—(1) Rat virus of Toulon. (2) Rat virus of Mexico. (3) Human virus Tunis. (4) Rocky Mountain fever. Rats were fed on the brains of guineapigs infected with virus No. 1 ; four rats were used and all became infected ; with the human virus one rat only out of 5 became infected.

The experiments show that rats may become infected through the digestive tract. *D. H.*

NICOLLE (Charles) & LAIGRET (J.). Extension du pouvoir immunisant des virus exanthématiques par association de deux virus d'origine différente. (Virus typhiques contre virus de la fièvre pourprée.) [**Increase of Immunizing Power by Association of Typhus Viruses of Different Origin.**]—*C. R. Acad. Sci.* 1933. Feb. 27. Vol. 196. No. 9. pp. 587–589.

LEPINE has recently pointed out that if an animal is repeatedly inoculated with the virus of typhus and then later tested with allied viruses such as Rocky Mountain fever and fièvre boutonneuse it will not react.

Nicolle inoculated 22 guineapigs once only with typhus virus—all reacted ; later on all were tested with Rocky Mountain fever virus and all reacted but one. However, of 3 monkeys which had each received 2 or 3 doses of typhus viruses of different origin 2 when tested some months later failed to react to Rocky Mountain fever.

Nicolle concludes that it is possible to protect animals by means of repeated doses of typhus viruses of different origin against closely allied viruses such as that of Rocky Mountain fever. *D. H.*

NICOLLE (Charles). Entretien du virus typhique historique (souche tunisienne) par passages de plèvre à plèvre, chez le cobaye. [**Maintenance of Historic Typhus Virus by Pleural Passage in Guineapigs.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 398–400.

The usual methods employed for carrying the typhus virus from guineapig to guineapig is by inoculation of emulsion of brain or of exudation from the swollen scrotum. The authors have used pleural fluid and have found that it gives as good results. *D. H.*

NICOLLE (Charles). Entretien du virus typhique historique (souche tunisienne) par passages sur rats. [**Maintenance of Historic Typhus Virus by Rat Passage.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 349–356.

In this series of experiments one guineapig and two white rats were inoculated on each occasion. As Professor Nicolle originally noted, the virus of epidemic typhus (European) produces only an inapparent infection in rats ; therefore a guineapig was inoculated for each pair of rats as an " indicator." One of the rats was killed to passage the virus, the other retained to be tested later for its presence. It was found that the brains of the rats might be infective both before and after the period of the fever in the guineapigs, from 4 days before to 2 days after. In this series of experiments the infection died out at the 13th passage. As the fever in the " indicator " guineapigs became less and less at the later passages, Nicolle considers that the virus had died out because the rat has resistance to the virus which therefore becomes weakened and not because the virus happened to be absent from the rat's brain at the time it was killed. The virus of epidemic typhus can be passaged practically indefinitely in guineapigs just as the virus of endemic typhus can be passaged in rats, this constituting a major differential point between these viruses as regards their action on experimental animals and on wild rats in nature. *D. H.*

NICOLLE (Charles) & LAIGRET (J.). Conservation des divers virus typhiques dans le cerveau des rats et cobayes infectés. [**Preservation of Typhus Viruses in Brains of Rats and Guineapigs.**]—*C. R. Acad. Sci.* 1933. Mar. 13. Vol. 196. No. 11. pp. 733–735.

A note by Professor Nicolle of some experimental work to show the different action on experimental animals of the viruses of epidemic (historique) and endemic (murin) typhus.

1. The virus of endemic typhus is still present and active in the brains of rats 60 days after the fever produced by the intraperitoneal injection of infected brain, whereas in guineapigs similarly inoculated the virus disappears by the 30th day.

2. The virus of epidemic typhus was tested by similar injection of a series of animals but these animals, rats and guineapigs, were killed at intervals from the 4th day after inoculation up to the 24th day (fever in controls from 7th to 15th day). Tests showed that in the guineapig brains the virus was present in much greater content than in the brains of the rats, the opposite of the result with the endemic virus. *D. H.*

NICOLLE (Charles) & LAIGRET (J.). Conservation des virus typhiques dans le cerveau des rats et des cobayes inoculés avec ces virus. [**Conservation of the Typhus Viruses in the Brains of Rats and Guineapigs.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3. pp. 357–380.

In this series of experiments a number of rats were inoculated and at the same time a similar number of guineapigs to act as "indicators."

In view of the fact that the virus of endemic typhus occurs naturally in the rat and produces a severe reaction the authors considered that the period of infectivity in the rat would be greater than after the infection produced by the epidemic virus.

Three rat typhus viruses were utilized in this work, one from Toulon and two from Mexico. The rats were killed at varying dates after inoculation and 1/10 of the emulsion of brain inoculated into a guineapig. Two dates are given, or rather numbers of days, the first being the number of days after the inoculation of the rat, the second the number of days after fever had ceased in the companion or "indicator" guineapig. Thus with the Toulon virus the two dates are 68 days and 60 days, that is the longest time after inoculation that the virus could be isolated from the brain of the rat was 68 days and after the fall of the fever in the guineapig 60 days. For guineapigs the figures were 32 days and 10 days. In rats infected with the Mexican virus this could be isolated 50 days after inoculation and 30 days after the cessation of fever in the guineapig, and 34 days and 20 days for guineapigs. That is to say that the virus remained viable in the rat much longer than in the guineapig ; the converse, as has been shown, occurs with the epidemic virus (European). [See previous paper.]

The historic virus (Tunis) was found to be viable in the brain of the rats from the 7th to the 16th day after inoculation and 4 days before the appearance of fever in the "indicator" guineapig till 2 days after the fall of the fever, *i.e.*, 16 days and 2 days as compared with 68 days and 60 days with the endemic virus. On the other hand the virus was viable in guineapigs up to the 20th day.

A second series of 24 rats was employed to confirm these results with the European virus but the virus was still viable on the 24th day when the last of the rats was killed.

A few experiments were also carried out on the same lines with the virus of Rocky Mountain spotted fever and apparently this virus disappears from the brains of rats before the 20th day after inoculation.

Thus, as was forecasted, the virus of endemic typhus remains viable in the brain of the rat for a much longer period than does the virus of European epidemic typhus ; also the virus of endemic typhus is viable in the brain of the rats for a longer period than in the brain of the guineapig, the reverse being the case with the epidemic virus. *D. H.*

NICOLLE (Charles), LAIGRET (J.) & GIROUD (P.). Transmission du typhus murin par piqûres et ingestion de puces infectées. [**Transmission of Rat Virus by Bites and by Ingestion of Infected Fleas.**]—*C. R. Acad. Sci.* 1933. July 31. Vol. 197. No. 5. pp. 377–378.

Nicolle fed 160 rat fleas (*X. cheopis*) on an infected guineapig , and afterwards placed them on a monkey on which they fed for several days ; the monkey became infected Seventy living fleas were collected from the monkey and killed with chloroform, half the number were emulsified and inoculated into guineapigs and half were rolled up in bread and fed to rats ; these animals also became infected. It is to be noted that none of the animals in these experiments developed fever (inapparent infections) , proof of infection consisted in inoculation of blood into guineapigs which in turn did not develop fever but were later proved to be immune to endemic typhus virus. *D. H.*

LÉPINE (P.). Sur la conservation des typhus exanthématiques chez le rat et la souris. [**Conservation of Typhus Viruses in Rat and Mouse.**]—*C. R. Soc. Biol.* 1932. June 17. Vol. 110. No. 21. pp. 442–444.

The author has found that if large doses of the virus of endemic typhus are injected into rats a very severe and often fatal reaction follows ; up to 70 per cent. of the animals may succumb ; smaller doses of the virus produce a febrile reaction and recovery. On the other hand injection of doses of the virus of true epidemic typhus into rats produces only an inapparent infection but the virus may survive for considerable periods in the inoculated animals, up to 94 days.

The author has found that in one at least of the strains of endemic typhus virus (strain A) passage through the guineapig causes it to lose its power of producing oedema of the scrotum in these animals and also its virulence for rats is diminished. It thus comes to resemble closely in its action the virus of epidemic typhus. *D. H.*

LAIGRET (J.) & JADIN (J.). Sensibilité de la souris blanche aux virus typhiques—passages conservation du virus dans le cerveau des souris. [**Susceptibility of the White Mouse to the Typhus Viruses.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol 21. No. 3. pp. 381–397.

The authors carried out a similar series of experiments to those described in the previous papers with Professor NICOLLF, but white mice were employed instead of rats.

The epidemic virus produces an inapparent infection in white mice just as it does in rats. The authors succeeded in passaging the virus of Mexican typhus (rat virus) 16 times through mice although in the later passages the indicator guineapigs showed no fever, an indication of loss of virulence in the virus. Passage was not attempted beyond the 16th generation. The epidemic virus (Tunis) could not be carried beyond the 2nd generation. The endemic or rat virus was viable in the brains of white mice up to the 40th day after inoculation whereas with the epidemic virus no inoculations were successful after the 10th day. *D. H.*

FELIX (A.). **Serological Types of Typhus Virus and Corresponding Types of** *Proteus*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. July 28. Vol. 27. No. 2. pp. 147–172. [83 refs.]

In previous papers (1931) the author has put forward the thesis that, in a general way, the viruses of various typhus-like diseases correspond to various types of Proteus. For instance X19 for epidemic and endemic typhus, XK for scrub typhus and for Japanese River fever; and further that the serum reactions with Proteus X types reflect the relationship as revealed with regard to cross immunity, as is evidenced with the diseases cited above; the epidemic virus protecting against the endemic but not against the heterologous virus of Japanese River fever.

Considerable attention has been directed recently to a malignant type of typhus occurring in S. Paulo, Brazil, and shown by PIZA and MONTEIRO to be carried by a tick. Sera from cases of this type of disease contain agglutinins for X19 in high titre, but Dr. Felix has found that in addition these sera also contain group agglutinins for XK which is not the case with the sera of patients suffering from true typhus or endemic typhus.

In 1929 Dr. LIMA of S. Paulo isolated from the faeces of a healthy child a strain of Proteus which was similar culturally and serologically to X19. (This child had a history of having suffered from a typhus-like disease 3 years previously.) This local strain was sent to Dr. Felix and he finds that when this strain of Proteus is inoculated into rabbits the serum develops agglutinins for X19 but also group agglutinins for XK, that is, exactly similar to the sera of patients suffering from the S. Paulo fever. Dr. Felix is of the opinion that this strain of Proteus is the local serological type of Proteus strain of S. Paulo associated with the local typhus virus. A true Proteus X19 when inoculated into rabbits does not produce group agglutinins for XK nor, as already said, does the sera of patients suffering from true typhus contain such group agglutinins. Dr. Felix designates this new strain of Proteus XL (Lima). In addition to producing group agglutinins for XK in rabbit sera, XL also produces some group agglutinins for X2, one of the original Proteus X strains. It is also interesting to note that the sera of patients suffering from or convalescent from S. Paulo typhus agglutinate Proteus X19 in higher dilution than they do Proteus XL (Lima). All these agglutinations refer to the O variety of the strains; the H agglutinins are common to X19, X2, XL and HK.

Another local strain, that associated with scrub typhus in Malaya, has also been studied by Dr Felix, but the curious thing about this strain is that although the O agglutinins of this XM strain correspond to XK, the H agglutinins are not similar.

Dr. Felix considers that if similar local strains of Proteus could be discovered for Rocky Mountain fever, fièvre boutonneuse, African tick fever, Indian tick fever, they would be of great importance in serological diagnosis as well as in further study of this group of viruses. At present the serum of cases of these diseases only shows group agglutination for known strains of Proteus characterized by low titre, late appearance, irregular reaction (occasionally negative). [In view of the fact recently reported that the virus of Rocky Mountain fever protects from the virus of S. Paulo fever it would be interesting to study the agglutination of OXL with the sera of Rocky Mountain fever patients.]

Main and Group Agglutinins in Different Varieties of Typhus

Name of Disease	Locality	Vector	Agglutination with *Proteus* X Types			Type of Main Antigen of Virus
			OX19	OX2	OXK	
Classical typhus ...	Old and New Worlds	Lice ...	+++	+	–	OX19
Tabardillo	Mexico ...	Lice and rat fleas	+++	?	–	OX19
Endemic typhus (Brill's disease)	South Eastern United States	Rat fleas	+++	?	–	OX19
Fièvre nautique ...	Toulon (Warships)	Rat fleas	+++	?	–	OX19
Endemic typhus ...	Australia ...	Unknown	+++	+	–	OX19
Tropical typhus, type W (Shop typhus)	Malaya & Dutch East Indies	,,	+++	+ ?	–	OX19
Tropical typhus, type K (scrub typhus)	,,	,,	–	–	+++	OXK
Tsutsugamushi . .	Sumatra and Malaya	Mites	–	–	+++	OXK
,, ...	Japan	,,	–	–	+++ (?)	OXK (?)
Rocky Mountain spotted fever	Western & Eastern United States	Ticks	+	+	+	Unknown
"Fièvre boutonneuse"	Marseilles, Tunis	,,	+	+	–	,,
"Fièvre boutonneuse" (Febbre eruttiva)	Italy	,,	+	+	+	,,
Tick-bite fever ...	South Africa ...	,,	+	+	+	,,
Tick-typhus ...	British India ...	,,	?	?	?	,,
São Paulo endemic typhus	Brazil ...	,,	+++	+	+	OX19

+++ = main agglutination. + = group agglutination. ? = not tested adequately.

Twenty-two sera of cases of fièvre boutonneuse were recently tested by Dr. Felix against his stock strains and by his routine method ; 5 of these sera gave negative reactions, the remainder agglutinated X19 in low dilutions and also X2, but did not agglutinate XK at all. The highest titre obtained was 1/2,000 as compared with a titre of 1/20,000 for the sera of typhus patients. An interesting point was that certain of the sera showed a titre of 1/2,000 for X19 and nil for X2, other sera agglutinated X2 at 1/2,000 and nil for X19, obviously, as Dr. Felix says, a group reaction. A table is given showing the serological reactions so far as at present known and divided up as has not been previously done into " main " and " group " reactions. The suggestion is made that the serological reactions so far as "main" agglutinins are concerned agree with the mode of transmission, but it will be noted that the group which has X 19 for its main agglutinin includes louse-borne, flea-borne, and tick-borne diseases.

Dr. Felix insists, and rightly, that serological methods are necessary for the elucidation of this complicated group of diseases and that if such work is undertaken it should be carried out along definite lines and utilizing similar methods. For this purpose he outlines the methods that are employed by himself and his co-workers.

First of all agglutinations should be carried out with the O type of Proteus and care must be taken to keep these O types free from the H variant. A curious thing is that although pure O types retain a steady titre of agglutination with typhus sera the presence of H variants in the suspension causes a fall in this titre. This reversion from O to H may take place in culture and therefore stock cultures must be checked from time to time by plating out on dry agar and rejecting the spreading colonies and picking out O colonies and subculturing these on to dry agar slopes. Suspensions may also be checked by agglutination tests with specific high titre rabbit sera. OX2 is less prone to H reversion than is OX19 but OXK is most prone of the three strains.

Dr. Felix has always preferred to use living suspensions for his agglutination tests but recently the Oxford Standard Laboratory have produced a formalinized suspension which he has found to give excellent results and which he recommends for use when living suspensions are not obtainable, or are liable to revert.

In order that local strains of Proteus may be obtained Dr. Felix gives some account of the methods he and others employed in the isolation of strains of Proteus from the blood and organs of typhus cases.

Isolation from blood.— 10 cc. of blood is taken in the first few days of fever into each of 5 or 6 small tubes, the blood is allowed to coagulate and the serum poured off till the clot is as free as possible from serum ; some of the tubes are put in the incubator at 37°C., others in the dark room at room temperature. Loopfuls of blood are taken daily from the centre of the clots and inoculated into serum broth and on to serum agar ; this process is continued for 10 days and then broth is poured into the tubes containing the blood clot and they are incubated and subcultures taken for several weeks.

Urine.—Urine is collected in sterile tubes, centrifuged, and the sediment washed and loopfuls of this are inoculated into serum broth tubes, and into serum agar and incubated.

Organs.—Small portions of organs obtained post mortem are placed in sterile tubes and loopfuls of these removed from day to day and inoculated into serum broth tubes and incubated.

Strains of Proteus vulgaris can be readily isolated from discharge from suppurating ears and from pus from other sources but so far none of these strains has shown any serological affinity for typhus sera so far as O agglutinins are concerned. *D. H.*

ZINSSER (Hans) & CASTANEDA (M. Ruiz). **Studies on Typhus Fever. X. Further Experiments on Active Immunization against Typhus Fever with Killed Rickettsia. XI. A Report on the Properties of the Serum of a Horse Immunized with Killed Formalinized Rickettsia.**—*Jl. Experim. Med.* 1933. Mar. 1. Vol. 57. No. 3. pp. 381–390 ; 391–398. With 4 charts.

Zinsser and Castaneda report further experiments on animals with their formalinized Rickettsia vaccine prepared from the serous fluid taken from irradiated rats which have been intraperitoneally inoculated with typhus virus (*ante*, p. 400).

About 15 cc. of a suspension of washed Rickettsia, almost comparable to typhoid vaccine in numbers of organisms, can be obtained from a single rat. The experiments recorded clearly show that active immunization of laboratory animals against the Mexican and endemic American typhus virus can be carried out with formalinized and washed vaccines prepared by the X-ray rat method described by the authors. This vaccine is being put to the test as a prophylactic in man by VARELA and others in Mexico.

A horse was immunized by repeated subcutaneous injections of the killed Rickettsia vaccine described in the previous article. The serum of this animal developed agglutinins for Proteus X19 in a dilution of 1–320. The serum also agglutinated the Weigl vaccine prepared from lice infected with the virus of European typhus. An interesting point noted was that this immune horse serum failed to protect against the European typhus virus but developed distinct protective action against the Mexican virus, whether mixed with the virus before injection, administered 1 week before the virus, or given 24, 48 or 72 hours after infection. *D. H.*

VARELA (Gerardo), PARADA (Angel) & RAMOS (Virgilio). **Active Immunization against Tunisian Typhus Fever with Mexican Typhus Vaccine.**—*Proc. Soc. Experim. Biol. & Med.* 1932. Nov. Vol. 30. No. 2. pp. 206–209.

Method of preparation of the vaccine.—Irradiated rats were inoculated intraperitoneally with an emulsion of the tunica of a typhus infected guineapig. Five days later the rats were killed and an emulsion of Rickettsia made in the peritoneal washings ; repeated centrifuging and washing gives a protein free emulsion, which is standardized to give approximately 1,000 million Rickettsia per cc. in 0·2 per cent. formolized saline solution. Guineapigs were inoculated with 3 doses of this vaccine ; all the controls reacted to test doses but 5 out of 10 inoculated guineapigs did not react. *D. H.*

KEMP (Hardy A.). **Typhus Fever : Some Notes on the Cultivation of the Virus and on Active Immunity.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 191–200. [21 refs.]

The author comments on the failure so far to cultivate the virus of typhus on or in any culture medium which does not contain tissue cells. He utilized a dextrose cystine agar medium which has been successfully used in the study of tularaemia. The blood of 10 cases of typhus was inoculated into 20 cc. tubes of this medium. Gram positive diphtheroids were isolated in pure culture from 6 of the cases. These cultures were inoculated into guineapigs but produced neither scrotal swelling nor typhus lesions in the brain and animals which were tested later were not immune to typhus virus. Kendall's (K) medium was also tested with 5 cases of typhus; 2 cases showed diphtheroids but these produced no typhus symptoms in guineapigs. There was no evidence of a filter passer stage in any of the cultures. Cultivation of a laboratory strain of Proteus on the K medium produced no change and gave no typhus reaction in guineapigs. *D. H.*

BRUMPT (E.). Réactions oculaires chez des lapins inoculés dans la chambre antérieure avec des virus de diverses fièvres exanthématiques. [**Ocular Reactions in Rabbits inoculated in the Anterior Chamber with Various Exanthematous Viruses.**]—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1202–1204.

Brumpt refers to the use of intra-ocular inoculation as used in bacteriology and to the recent work of NAGAYO and others on Japanese River fever [see this *Bulletin*, Vol. 29, p. 25]. The virus employed in the present research was obtained from infected lice (typhus) and from infected ticks (Rocky Mountain fever and fièvre boutonneuse).

In the typhus experiment all of six inoculated rabbits showed a positive reaction with iritis and keratitis of long duration; in one instance opacity of the cornea lasted for 89 days with increase of the size of the eyeball: there was no general reaction (fever).

In the Rocky Mountain fever experiments all of four rabbits reacted with iritis and keratitis but the reaction was less severe and there was no enlargement of the eyeball. Two rabbits which had previously reacted to typhus virus in one eye and recovered reacted anew to the Rocky Mountain fever virus inoculated into the other eye. With the virus of fièvre boutonneuse obtained from the blood of a typical case and inoculated into the eyeball of a rabbit no reaction resulted but with the virus obtained from infected ticks there was a slight reaction.

D. H.

KODAMA (M.) & KONO (M.). **Studies on Experimental Transmission of Virus of "Eruptive Fever" and "Typhus" by Several Blood Sucking Insects.**—*Kitasato Arch. Experim. Med.* 1933. Apr. Vol. 10. No. 2. pp. 99–112. [20 refs.]

The title of this paper is misleading; by "eruptive fever" the authors mean endemic typhus (Brill's disease). In previous papers, already reviewed, the authors have shown that there are two types of typhus in Manchuria—epidemic typhus carried from man to man by the body louse and endemic typhus carried from rat to man by the rat flea; similar findings had already been made in America and in Europe.

In the present paper experiments were carried out with the endemic virus with various insects including body lice, the human, dog, cat and rat fleas, bed bugs and lice from monkeys, guineapigs and rats. The authors succeeded in transmitting the virus to experimental animals by body lice (human), human fleas, and cat and rat fleas and rat mites;

but they consider that so far as man is concerned the principal vector is the rat flea, *Xenopsylla cheopis*. They think that the endemic virus becomes changed into the epidemic by repeated passage through louse and man. [This suggestion has already been made but so far has not been generally accepted.] *D. H.*

KODAMA (Makoto) & TAKAHASHI (Kensaburo). **Different Points of the Scrotal Reaction of Male Guineapigs Infected with "Eruptive Fever" and "Typhus."**—*Kitasato Arch. Experim. Med.* 1933. Apr. Vol. 10. No. 2. pp. 113–119.

Scrotal reaction is practically constant in guineapigs inoculated with the virus of endemic typhus but only occurs occasionally in animals inoculated with the epidemic virus. If the endemic virus is transmitted through lice the scrotal reaction is not produced in guineapigs at first but appears again when passaged.

The authors describe certain differences in the reaction when produced by the endemic virus or by the epidemic. The difference would appear to be rather one of degree than of kind. The reaction with the endemic virus is severe but with the epidemic it is slight and temporary. Adhesions are firm and strong with the endemic virus but slight and easily separated with the epidemic virus. The exudation in the endemic reaction is thick yellow and abundant and contains numerous polymorphonuclear cells and few lymphocytes and numerous cells containing Rickettsia, whereas the exudation in the epidemic reaction is thin, white in colour and contains mostly lymphocytes with only a few Rickettsia-containing cells. *D. H.*

MARCANDIER (A.) & PIROT (R.). Fréquence du virus du typhus endémique (typhus murin) dans l'encéphale des rats des navires de guerre à Toulon. [**Frequency of Virus of Endemic Typhus in Brains of Rats of Warships at Toulon.**]—*Bull. Soc. Path. Exot.* 1932. July 6. Vol. 25. No. 7. pp. 673–677.

During December 1931 and January 1932 there was a small outbreak of endemic typhus on the cruiser "Paris" in Toulon harbour: there were no cases on any of the other ships of the squadron or among the shore establishments. 104 rats were caught on the ships and on shore and the brains emulsified and injected into guineapigs. From 19 of these rats caught on shore no reaction was obtained. From 39 rats caught on the other ships on the squadron no reaction. But of 46 rats caught on the cruiser "Paris" approximately 25 per cent. were proved to be infective by means of reaction in the inoculated guineapigs.

D. H.

BRUYNOGHE (R.) & JADIN (J.). La présence du virus du typhus exanthématique dans le cerveau de rats du port d'Anvers [**Typhus Virus in the Brains of Antwerp Rats.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 20. pp. 399–400.

The authors examined rats captured on board a steamer in the port of Antwerp recently arrived from Alexandria and North African ports. Emulsion of brains of these rats when inoculated into guineapigs produced a febrile reaction with swelling of the testicles. The virus was passed through a series of guineapigs and numerous Rickettsia were found in smears made from the tunica. In white rats the virus produced a febrile reaction and a positive Weil-Felix reaction in the serum. *D. H.*

BRUYNOGHE (R.) & JADIN (J.). Le virus du typhus exanthématique. [**Typhus Virus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1522–1523.

In a previous communication (above) the authors signalized the recovery of the virus of endemic typhus from rats captured on board ship in Antwerp. They have now been able to compare the local virus with a virus obtained from Professor NICOLLE (Mexican rat virus) and find that cross immunity experiments were positive. The authors employing an emulsion of tunica of infected guineapigs rich in Rickettsia found that filtration in no way reduced the virulence of the inoculum although, presumably, the majority of the Rickettsia were retained by the filter. Local rodents such as the dwarf mouse (*M. minutus*) were found to be susceptible and many died of the infection.

D. H.

BLANC (Georges), NOURY (M.), BALTAZARD (M.) & FISCHER (M.). Sur la présence, dans l'encéphale des rats de Casablanca, d'un virus ayant les caractères du " typhus murin." [**Typhus Virus in the Brains of Rats of Casablanca.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 18. pp. 132–133.

From 200 rats captured in Casablanca, Morocco, 3 strains of virus were obtained by inoculation of emulsions of the brains into guineapigs.

The first strain was obtained on 10th January 1933, when a mixed emulsion of the brains of 8 rats was employed—4 *M. norvegicus*, 2 *M. alexandrinus*, 2 *R. rattus*. The injection of an emulsion of 11 *M. norvegicus* was successful and also later an emulsion of the brains of 4 *M. norvegicus* and 1 *R. rattus*. The usual reaction of fever with testicular swelling was recorded in all the guineapigs. Infection with the spirillum of " sodoku " was carefully excluded.

The 3 viruses have been passaged in guineapigs to the 17th passage. Crossed immunity experiments with a virus of endemic typhus obtained from Toulon were positive. *D. H.*

WORKMAN (W. G.). **Typhus Fever. Experimental Transmission of Endemic Typhus Fever of the United States by** *Xenopsylla astia.*—*Public Health Rep.* 1933. July 7. Vol. 48. No. 27. pp. 795–797.

Transmission of the virus of endemic typhus from an infected to a non-infected white rat was accomplished by *X. astia.* Crushed infected fleas rubbed upon the abraded skin produced endemic typhus in guineapigs. Faeces collected from infected fleas were shown to contain the virus of endemic typhus. *D. H.*

JELIN (W.) & GROSSMANN (J.). Ueber experimentellen Fleck-typhus bei Zieselmäusen. [**Experimental Typhus in Ground Squirrels.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. July. Vol. 37. No. 7. pp. 346–355. With 10 figs.

The virus employed in this research was typhus virus (epidemic) which had been passaged in guineapigs. Thirty five ground-squirrels were inoculated and proved to be susceptible. They reacted with fever and their blood and tissues were infective for guineapigs. Typhus nodules were found in their brains. *D. H.*

COMBIESCO (D.), BONCIU (C.), STAMATESCO (S.) & COMBIESCO (N.). Sur la sensibilité du spermophile au typhus exanthématique épidémique. [**Susceptibility of the Spermophile to Epidemic Typhus Virus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 499–500.

The spermophile which has already been shown to be susceptible to the virus of " boutonneuse " fever is also susceptible to typhus virus. These animals develop fever lasting 6 days after an incubation period of 4 days. The brain of one animal killed 30 days after inoculation proved to be virulent. The virus can be passed in series from one spermophile to another. *D. H.*

COMBIESCO (D.) & ANGELESCO (J.). Recherches expérimentales sur le typhus exanthématique chez le chien. [**Experimental Typhus in the Dog.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 497–498.

Two puppies were inoculated intracerebrally and intraperitoneally each with half the emulsion of the brain of a guineapig, killed during fever following inoculation of epidemic typhus virus (Poland strain). Neither showed any reaction. One dog was killed on the 14th day and an emulsion of the brain inoculated into two guineapigs; both reacted after an incubation period of 7 days with fever lasting nine days. The virus was passaged from these guineapigs. The other dog was killed on the 26th day after inoculation and emulsion of its brain also proved infective for guineapigs. Another puppy was inoculated with the virus (guineapig brain) of endemic typhus (Mexico); this animal did not develop fever but its brain proved to be infective for guineapigs. *D. H.*

DURAND (Paul). Etude expérimentale de quelques virus exanthématiques chez le chien. [**Study of Typhus Viruses in the Dog.**]—*Arch. Inst. Pasteur de Tunis.* 1933. Apr. Vol. 21. No. 3 pp. 484–503. With 7 graphs.

It has already been shown by the author that dogs are susceptible to the virus of " fièvre boutonneuse " if young puppies, which have not been exposed to tick bite, or dogs from areas of countries where the disease does not exist are selected. Although the disease in such animals is without any clinical manifestation, the infection can be demonstrated by inoculation of the blood or organs into susceptible animals and by the fact that a positive Weil-Felix reaction appears in the serum of the infected dog. So far dogs have not been proved to be susceptible to infection with any of the other typhus viruses. For the present research stray dogs were collected in Tunis and any who showed a positive Weil-Felix reaction greater than 1/50 were rejected.

The viruses employed in this research were :—3 strains of European epidemic typhus : 1 strain of typhus from Mexico ; 1 strain of typhus from Toulon ; 1 strain of the virus of Rocky Mountain spotted fever. These viruses were inoculated by various routes and in variable doses;

none of the animals reacted clinically in any way; all developed a positive Weil-Felix reaction in the serum. The reaction was tested before inoculation and once or twice a week thereafter for six weeks. The results are displayed in graphic form by means of charts; the strains of Proteus employed were X19 and X2. It was found that many of the sera agglutinated XK before inoculation, and as there was no subsequent rise of titre for this strain the charts only show the results with X19 and X2. The maximum point of the reaction was usually noted between the 10th and 15th day after inoculation and the titre returned to its original level after about six weeks. Practically all the sera gave a positive reaction in a dilution of 1/100, many reached 1/200 and the highest rise noted was 1/400. The strain X19 gave the better results, although agglutinins for X2 were produced in the majority and in two cases in higher titre than for X19.

It was not possible to note any difference in the reaction according to the virus employed nor apparently had the route of inoculation or the amount of the dose any influence. Some of the dogs were killed during the infective period and blood or organs inoculated into guineapigs, with positive results in the case of the typhus viruses (epidemic and endemic) but not with the Rocky Mountain fever virus. *D. H.*

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i. TZECHNOWITZER (M.), MOLDAVSKAYA-KRITCHEVSKAYA (V.), GORCHOWA (E.) & FRIDMAN (G.). Réaction de mélano-floculation de Henry et typhus exanthématique. [**Henry's Reaction and Typhus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 26. pp. 1093–1094. With 1 fig.

ii. KAROUT (T.) & MOLDAVSKAYA-KRITCHEVSKAYA (V.). Réaction de mélano-floculation de Henry et typhus exanthématique expérimental du lapin.—*Ibid.* pp. 1094–1095. With 1 fig.

i. The authors carried out the pigment flocculation tests as employed in malarial cases in 100 cases of typhus. In 95 the reaction became positive during the course of the fever, following closely the curve of the Weil-Felix reaction.

ii. Six rabbits inoculated with typhus virus developed a positive Weil-Felix reaction and at the same time the pigment flocculation reaction became positive both reactions becoming normal together. *D. H.*

MONTEIRO (J. Lemos) & DA FONSECA (Flavio). Typho exanthematico de S. Paulo. XII. Sobre um "virus" isolado de ratos da zona urbana da cidade e suas relações com o do typho exanthematico de S. Paulo. [**Exanthematic Typhus of S. Paulo. XII. Relations of the Virus with that Isolated from Urban Rats.**]—*Brasil-Medico.* 1932. Dec. 10. Vol. 46. No. 50. pp. 1029–1033. [15 refs.]

The authors isolated a virus from town rats (*Epimys norvegicus*) in S. Paulo and compared it with the virus from human cases of the local form of endemic typhus. By inoculation experiments in guineapigs and by absence of cross-immunity, they are convinced that the two are quite distinct. They propose to name the Rickettsia of the rat virus *R. muricola.* *H. H. S.*

MONTEIRO (J. Lemos) & DA FONSECA (Flavio). Typho exanthematico de São Paulo. XI.—Novas experiencias sobre a transmissao experimental por carrapatos—(*Boophilus microplus* e *Amblyoma cajennense*). **[Typhus of S. Paulo. Transmission by Ticks.]**—*Brasil-Medico.* 1932. Nov. 26. Vol. 46. No. 48. pp. 993–995. English summary.

Further work on the transmission of the virus of São Paulo typhus fever has shown that the probable carrier is the tick *Amblyomma cajennense.* Experiment has shown that this tick can convey the disease to man by its bite and that the virus is transmissible hereditarily. Rickettsia have been demonstrated in sections and smears from infected ticks. *D. H.*

MONTEIRO (J. Lemos) & DA FONSECA (Flavio). Nouvelles expériences sur la transmission expérimentale du typhus exanthématique de Sao Paulo par des tiques (*Boophilus microplus* et *Amblyomma cajennense*). **[Experimental Transmission of S. Paulo Typhus by Ticks.]**—*C. R. Soc. Biol.* 1933. Feb. 3. Vol. 112. No. 4. pp. 397–400.

The authors have continued their experimental work on the virus of the S. Paulo typhus in relation to the vector.

The cattle tick *Boophilus microplus* and the horse tick *Amblyomma cajennense* were employed in the experiments described. Ticks were fed on infected guineapigs during the period of fever and later on clean animals, or else an emulsion of the fed ticks was made and injected. In a further experiment eggs were collected which had been deposited by a female tick previously fed on an infected guineapig and an emulsion of these eggs was injected into guineapigs. Only in 1 instance out of 9 was the transmission successful with the cattle tick, but on the other hand both by bite and injection of crushed amblyomma ticks or eggs, infection was produced in practically every instance. This tick is a very common one in the district where the disease is most prevalent. *D. H.*

PARKER (R. R.) & DAVIS (Gordon E.). **Protective Value of Convalescent Sera of Sao Paulo Exanthematic Typhus against Virus of Rocky Mountain Spotted Fever.**—*Public Health Rep.* 1933. May 12. Vol. 48. No. 19. pp. 501–507. With 2 charts.

The technique employed in testing the protective power of the convalescent sera of animals recovered from exanthematous fever of Sao Paulo was as follows : 0·5 cc. of the sera was mixed with 0·1 cc., 0·25 cc. and 0·5 cc. of serum-virus of Rocky Mountain fever of a known strain of high virulence ; after standing for half an hour the mixtures of convalescent serum and serum-virus were inoculated intraperitoneally into guineapigs. Controls were inoculated with the serum virus in the same dose. Three of the six Sao Paulo sera tested showed complete protection, one other serum gave nearly as good results and with another sample the animals receiving the smaller doses of virus were protected ; the guineapigs receiving the largest dose, 0·5 cc. of serum-virus, showed slight fever (one day only) ; all controls died. The sixth sample of serum gave partial protection. These results, as the authors say, suggest a close relationship between the virus of Rocky Mountain fever and that of Sao Paulo fever. It remains to be seen whether the sera of animals recovered from Rocky Mountain fever would protect against the virus of Sao Paulo fever. *D. H.*

PARKER (R. R.) & DAVIS (Gordon E.). **Further Studies on the Relationship of the Viruses of Rocky Mountain Spotted Fever and Sao Paulo Exanthematic Typhus.**—*Public Health Rep.* 1933. July 21. Vol. 48. No. 29. pp. 839–843. With 3 charts.

In the present paper the authors report protection tests with the serum of Rocky Mountain fever convalescents against Sao Paulo virus.

Four samples of sera were tested, and all four neutralized the Sao Paulo virus. Crossed immunity tests were also carried out. Twelve guineapigs which had recovered from Rocky Mountain fever were taken; of these 6 were inoculated with Sao Paulo virus and 6 were reinoculated with Rocky Mountain fever virus. In each group 5 guineapigs did not react in any way and 1 had slight fever.

The authors conclude that these data, together with the previous findings, suggest that Sao Paulo typhus and Rocky Mountain spotted fever are immunologically identical. *D. H.*

DYER (R. E.). **Relationship between Rocky Mountain Spotted Fever and "Exanthematic Typhus of Sao Paulo."**—*Public Health Rep.* 1933. May 19. Vol. 48. No. 20. pp. 521–522.

The virus was received from Sao Paulo. Six infected ticks, *Amblyomma cajennense,* were inoculated into guineapigs and all reacted with fever. The virus has now been passed through 9 generations, 99 animals in all, 90 per cent. of which died. The symptoms noted were exactly the same as those produced by a fairly virulent strain of the virus of Rocky Mountain fever.

Crossed immunity experiments showed that animals which had reacted to Sao Paulo virus and recovered did not react when later inoculated with Rocky Mountain Fever virus and also the Rocky Mountain Fever virus protected against the Sao Paulo virus. The conclusion is that the Sao Paulo disease is identical with Rocky Mountain spotted fever. *D. H.*

BADGER (L. F.). **The Laboratory Diagnosis of Endemic Typhus and Rocky Mountain Spotted Fever with Special Reference to Cross-Immunity Tests.**—*Amer. Jl. Trop. Med.* 1933. Mar. Vol. 13. No. 2. pp. 179–190. With 6 charts.

Three strains of the virus of spotted fever, eastern type, have been studied by the author and compared with the virus of Rocky Mountain spotted fever, western type.

The reactions in monkeys and rabbits were similar but in guineapigs it was noted that the testicular reaction, which is practically invariable with the western type virus, only appeared occasionally with the eastern type virus. An elaborate series of crossed immunity tests was carried out and a series of charts of these tests is given. The author points out that in crossed immunity tests, especially when employing a virus such as true typhus which produces fever alone in guineapigs, the results may be complicated by the presence of bacterial secondary invaders; careful cultural controls are necessary as well as control inoculation of animals immunized to the test virus in addition to fresh normal animals. It should be remembered also that spontaneous or natural immunity to typhus viruses may be met with in guineapigs, for instance out of 200 normal animals inoculated with the virus of endemic typhus 11 per cent. failed to react. As an example of the secondary bacterial invaders a strain of *Bact. enteritidis* was studied. A series of immune spotted fever and typhus guineapigs tested with *Bact. enteritidis* showed increased resistance, nearly 53 per cent. failing to react as compared with 11 per cent. in a normal series. In the same way a smaller percentage of animals which had reacted to enteritidis virus failed to react when subsequently inoculated with spotted fever and typhus virus. *D. H.*

BRUMPT (E.). La fièvre boutonneuse et la fièvre pourprée des montagnes Rocheuses sont deux maladies distinctes. Résultats de l'épreuve de l'immunité croisée dans les maladies exanthématiques. **[Fièvre boutonneuse and Rocky Mountain Fever Two Distinct Diseases.]**—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1197–1199. With 1 fig.

Two guineapigs which had reacted to the virus of boutonneuse fever were reinoculated on the 9th day of the infection with the virus of Rocky Mountain fever; they showed the typical reaction, fever and swelling of the scrotum, exactly similar to controls, no protection.

Nine guineapigs which six weeks earlier had reacted to typhus virus were inoculated with the virus of Rocky Mountain fever; all reacted as did control animals; *i.e.*, there was again no protection.

D. H.

BADGER (L. F.). **Rocky Mountain Spotted Fever and Boutonneuse Fever. A Study of their Immunological Relationship.**—*Public Health Rep.* 1933. May 12. Vol. 48. No. 19. pp. 507–511. With 4 charts.

Professor BRUMPT recently carried out a series of cross-immunity experiments with the viruses of Rocky Mountain spotted fever (western type) and of "fièvre boutonneuse" and found that they did not protect against one another. The author obtained the virus of boutonneuse fever from BRUMPT who sent to him some infected Rhipicephalus ticks. This virus was tested in cross immunity experiments against the virus of spotted fever of the Eastern States. It was found that guineapigs which had reacted to boutonneuse fever even with only a slight fever did not react when later inoculated with the virus of spotted fever (eastern type); also animals which had recovered from an attack of fever due to spotted fever virus did not react when subsequently inoculated with the virus of boutonneuse fever. The author considers that the results of these tests suggest that boutonneuse fever and Rocky Mountain fever are immunologically identical. *D. H.*

BADGER (L. F.). **Rocky Mountain Spotted Fever (Eastern Type)—Virus recovered from the Dog Tick** ***Dermacentor variabilis*** **found in Nature.**—*Public Health Rep.* 1932. Dec. 30. Vol. 47. No. 53. pp. 2365–2369.

Dog ticks (*Dermacentor variabilis*) were collected in the Eastern States, Maryland and Virginia, where spotted fever (Rocky Mountain fever) is now known to occur. Emulsions of these ticks were made and inoculated into guineapigs and a virus isolated. This virus was shown to be identical with that of Rocky Mountain fever by the following tests. The symptoms produced in laboratory animals were the same as those produced by a virus of known origin, the brain lesions produced were also comparable. The Maryland virus produced agglutinins for Proteus X19 in the serum of rabbits and monkeys and complete crossed immunity with the virus of Rocky Mountain fever was demonstrated. The same virus was also obtained by feeding ticks on guineapigs.

Tables of the crossed immunity experiments are set out. *D. H.*

BADGER (L. F.). **Rocky Mountain Spotted Fever: Susceptibility of the Dog and Sheep to the Virus.**—*Public Health Rep.* 1933. July 7. Vol. 48. No. 27. pp. 791–795. With 1 fig.

Three dogs, 2 grown and 1 puppy, were inoculated with the virus of Rocky Mountain spotted fever. The inoculations produced no clinical manifestations in the larger dogs; the puppy reacted with fever and respiratory symptoms. From one of the larger dogs the virus was recovered on the 4th, 6th and 8th but not on the 10th day after inoculation. The virus could not be recovered on the 1st and 2nd day after inoculation in the puppy but was present on the 4th day. A grown dog raised in an endemic area was found to be immune to the virus as were the two dogs employed in the above experiments when tested later.

D. andersoni ticks infected with the virus of Rocky Mountain fever were fed on two puppies. Both became infected after incubation periods of 5 to 6 days. A lamb was injected with the virus and this was recovered from the blood on the 4th, 6th, 8th and 10th days. *D. H.*

DYER (R. E.). **Typhus and Rocky Mountain Spotted Fever in the United States.**—*Milit. Surgeon.* 1933. June. Vol. 72. No. 6. pp. 421–439.

This is the Kober lecture for 1933 delivered to the Association of Military Surgeons of the United States.

A survey of the different types of typhus-like diseases reported in various countries is given; followed by an interesting historical account of Rocky Mountain spotted fever in the Western States and its recent discovery in the Eastern States of N. America. It is pointed out that epidemic louse-borne typhus was originally imported into Mexico by the Spaniards and has remained prevalent in the Highlands of that country, but has never established itself in N. America although frequently introduced into the States both from Mexico and overseas. Typhus in the States is a true endemic disease and has been shown by the writer and others to be carried from rats to man by the rat flea. Dr. Dyer favours the theory that the virus of typhus is kept alive in rats as a disease of rats and occasionally is transferred to man and if a case of endemic typhus should happen to occur in the midst of a crowded and destitute community who are lousy such a case may be the starting point of a louse-borne epidemic of true typhus. The observation that cases of endemic typhus are common in the States and yet epidemics of louse-borne typhus do not arise may be explained by the fact that practically all cases of endemic typhus occur in the summer and autumn when lousiness is at its lowest; the maximum prevalence of fleas is in the summer and of lice in the winter. In view of the confusion of the Eastern type of spotted fever with endemic typhus some of the principal differential diagnostic points are detailed, such as the difference in the distribution of the rash and the fact that spotted fever on the whole is the more severe disease, with rapid pulse compared with the slower pulse of endemic typhus. Inoculation into guineapigs may be necessary, however, before a definite opinion can be given; the Eastern spotted fever virus does not give rise to scrotal swelling, whereas the western type virus and endemic typhus virus do, and in the former there is also ulceration. A guineapig which has reacted to the virus of spotted fever is protected from the same virus but reacts to the virus of endemic typhus and vice versa. Dr. Dyer remarks that the Weil Felix reaction is of no assistance in differentiating a case of spotted fever from one of endemic typhus, but FELIX considers that the X19 agglutination with the serum of endemic typhus is a main agglutination whereas in spotted fever it is only a group agglutination. The methods of prevention against the two diseases are then discussed, in the one case directed against ticks and in the other against the rat and rat flea. Much further work has yet to be done before the problems of the typhus group of diseases will be finally settled. The lecturer suggests two main questions which require answers:—

1. What relation do the typhus-like diseases bear to each other?
2. Do these diseases arise from a common source and are their differences due to variations or mutations which are determined by their arthropod hosts? *D. H.*

PARKER (R. R.). **Certain Phases of the Problem of Rocky Mountain Spotted Fever. A Summary of Present Information.**—*Arch. Pathology*. 1933. Mar. Vol. 15. No. 3. pp. 398–429.

This interesting and important paper contains the results of six years' work on the subject of Rocky Mountain fever by the author and his associates.

Three species of tick have now been demonstrated as carriers in nature of the virus of Rocky Mountain fever, the wood tick *Dermacentor andersoni*, *D. variabilis* the dog tick and *Haemaphysalis leporis* the rabbit tick; the first two bite man, the last does not, but serves to keep the infection going among the susceptible rodents and thus supplies a reservoir of the disease. The virus has also been passed successfully in the laboratory by means of *Rhipicephalus sanguineus* and *Amblyomma americanus*, the Lone Star tick, which readily bites man and has been blamed for causing cases of Rocky Mountain fever. The author has studied the virus in the blood and tissues of man and animals and in the tick. As regards the blood virus it has been noted that although as small a quantity of blood as 0·001 cc. may be infective Rickettsia cannot be demonstrated in films of blood.

Tick virus.—If ticks are fed on an infective animal there is a "period of invasion" which may last for 12 days; during this period the blood virus is changed into "tick virus." If some of these ticks are removed at time of feeding and injected into guineapigs they will be found to be highly infective, but during the "period of invasion" they are non-infective and after that time the virus in the ticks is of low virulence and may only produce a symptomless attack, which however produces immunity—"inapparent infection." Adult ticks and nymphs do not again feed in the same stage of development but hibernate and during hibernation the virus still remains of low virulence, but after a second blood feed the virus is "reactivated" and may then become of high virulence, with 100 per cent. fatality. The same reactivation occurs in the hot weather, and after this reactivation many more Rickettsia appear in the tick. In a group of infective ticks some may be found which show high virulence and few Rickettsia and others which have low virulence but large numbers of Rickettsia; the possibility of an ultramicroscopic stage is suggested by these facts. It is interesting to note that the rabbit tick *H. leporis* invariably produces a virus of low virulence. The process in nature, it is suggested, is as follows: the virus survives the winter in adult ticks which in the spring feed on cattle (non-susceptible), eggs are laid and infective nymphs and larvae emerge and feed on small rodents which are susceptible and which become infected; clean larvae and nymphs feed on these infected animals and pick up the virus which is occasionally passed on to man.

The virulence of the virus in the tick varies from low grade non-symptom-producing to one that will produce 100 per cent. fatality, yet the *maximum* level of virulence is the same in one tick population and this may be high, intermediate, or low. In each tick population the virulence may vary in individual ticks but the maximum virulence is never exceeded for that district.

In the opinion of the author the virus of Rocky Mountain fever is widespread in the tick population of America, but where the virulence is low human cases do not occur or are so slight as to escape detection. Diagnosis of cases may be assisted by (1) Infection tests. Positive results are readily obtained by inoculation of small quantities of blood into guineapigs. (2) The Weil-Felix reaction is also useful as an aid to diagnosis. (3) Protection tests; the serum of the case is mixed with known virus and inoculated into guineapigs.

As regards control and prevention the author recommends: (1) avoidance of tick bites by keeping clear of known dangerous areas; if this is impossible then special clothing should be worn, (2) early removal of ticks. As ticks when they first attach to bite contain only a low grade virus and the virus takes some hours to reactivate, it is possible, if ticks are removed at once, to avoid infection. It should be remembered that if a tick has recently fed or partly fed and bites again the virus will be reactivated and become of high virulence, and early removal will be of no avail. Thus if exposed to the possibility of infective tick bite careful examination for ticks should be made at least twice a day and all ticks removed. A vaccine has now been prepared from infected ticks and this should be employed in zones where the disease is of a dangerous type. *D. H.*

PHILIP (Cornelius B.) & PARKER (R. R.). **Rocky Mountain Spotted Fever. Investigation of Sexual Transmission in the Wood Tick *Dermacentor andersoni*.**—*Public Health Rep.* 1933. Mar. 17. Vol. 48. No. 11. pp. 266–272.

The experiments recorded in this paper demonstrate that Rocky Mountain spotted fever virus may be transmitted from infected ticks of one sex to normal individuals of the opposite sex during copulation; these other ticks can then infect animals by their bite. *Dermacentor andersoni* was the tick employed. *D. H.*

PARKER (R. R.), PHILIP (Cornelius B.) & JELLISON (Wm. L.). **Mountain Spotted Fever. Potentialities of Tick Transmission in Relation to Geographical Occurrence in the United States.**—*Amer. Jl. Trop. Med.* 1933. July. Vol. 13. No. 4. pp. 341–379. With 10 charts & 1 plate. [31 refs.]

This paper concerns the transmission of Rocky Mountain spotted fever by 8 species of North American ticks.

Information relative to the known carriers, *D. andersoni*, *D. variabilis* and *Haemaphysalis leporis* (the rabbit tick) is summarized. Protocols of transmission experiments of 5 additional species of ticks are now given. Generation to generation transmission from larva to larva has been demonstrated with 3 of these, *D. occidentalis*, *Rhipicephalus sanguineus* and *Amblyomma americanus*, the lone star tick and with two other species, *A. cajennense* and *D. parumapertus* (rabbit Dermacentor); continuity of infection from larva to adults was shown. These data are considered sufficient to indicate that each of these species is a possible natural carrier of spotted fever virus either from rodent to rodent or rodent to man. In all sections of the United States there are ticks that are actual or potential carriers of the virus either in nature only or to man as well.

It is interesting to note that two of these ticks, *R. sanguineus* and *A. cajennense*, have already been shown to be carriers of disease, the former of the virus of boutonneuse fever and the latter of the typhus fever of Sao Paulo, and that recently both these diseases, which resemble spotted fever clinically, have been shown to be immunologically identical with that disease. *D. H.*

BRUMPT (E.). Hôtes vecteurs vicariants du virus de la fièvre pourprée des montagnes rocheuses. [**Vicarious Vectors of the Virus of Rocky Mountain Fever.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 28. pp. 1362–1366.

In carrying out these experiments in France Professor Brumpt utilized a Rocky Mountain fever virus received from Dr. PARKER in Montana, U.S.A. Referring to this virus Professor Brumpt says "qui donne à l'homme, ainsi que les excellents collègues qui m'ont soigné au cours de mon infection accidentelle ont pu constater, une maladie extrêmement grave." [All readers of this *Bulletin* join in congratulating Professor Brumpt on his recovery from his dangerous illness.] The local ticks employed in this research were *Dermacentor reticulatus*, *Rhipicephalus sanguineus*, *Amblyomma cajennense*, *Haemaphysalis concinna*, and the author found that the virus of Rocky Mountain fever could adapt itself completely to all these ticks and they conveyed the infection from infected to normal guineapigs.

D. H.

RUMREICH (Adolph S.). **The Typhus and Rocky Mountain Spotted Fever Group: Developments in Epidemiology and Clinical Considerations.**—*Jl. Amer. Med. Assoc.* 1933. Feb. 4. Vol. 100. No. 5. pp. 331–334. With 3 figs.

The author refers to cases of spotted fever (Rocky Mountain fever) which have recently been shown to occur in the Eastern States along the Atlantic seaboard of America. Similar cases had previously been confused with epidemic or endemic typhus and enteric fever. He sets out in detail the differential diagnosis on epidemiological and clinical grounds between endemic typhus and spotted fever.

The following points are noted : cases of endemic typhus are predominantly of urban origin and occur in association with rat infestation ; spotted fever occurs in persons living in rural sections on premises which may be rodent free and in a significantly high percentage there is a history of tick bite. [Compare FLETCHER'S two types of tropical typhus, urban and scrub.]

The incubation period of endemic typhus is from 7 to 14 days, that of spotted fever less than a week. The rash in endemic typhus appears on the 4th to 6th day, first on the chest and abdomen, then on the arms and legs, with in many cases no further extension. The rash is macular, rose or dull red in colour, fading on pressure, later papular and persists from 2 to 9 days, then rapidly fades. In spotted fever the rash nearly always appears first on the wrists and ankles, next on the back and then becomes generalized ; the palms and soles are frequently involved and the face commonly. The rash at first consists of rose macules but later becomes petechial and purpuric and is most abundant on wrist, ankles, legs, back, chest, abdomen, palms, soles and face, in the order named. It may persist for weeks as purple or yellowish brown spots. In spotted fever enlargement of the spleen and Kernig's sign are noted. The mortality in spotted fever, Eastern type, is from 20 to 25 per cent., the mortality in endemic typhus less than 1 per cent. Endemic typhus is rare in children, whereas spotted fever predominates in them. *D. H.*

HARRIS (Paul N.). **Histological Study of a Case of the Eastern Type of Rocky Mountain Spotted Fever.**—*Amer. Jl. Path.* 1933. Jan. Vol. 9. No. 1. pp. 91–104. With 19 figs. on 4 plates. [12 refs.]

The author made a very complete and careful examination of the histopathology of a fatal case of the Eastern States type of spotted fever (Rocky Mountain fever). His findings agree with those of WOLBACH in European typhus but like LILLIE* [this *Bulletin*, Vol. 29, p. 445] he found a third type of lesion in the brain which so far has not been described either in European typhus or in the Western type of spotted fever.

This lesion is a very striking one and was more extensive than the usual typhus lesions which were also present ; it occurs in close association with partially or completely occluded arterioles and consists essentially of degeneration in an adjacent focus of the axones ; these are seen to be greatly swollen and nearly globular at points. The conditions present in this case are very fully illustrated by excellent microphotographs. It remains to be seen whether now that this special lesion has been described further research may not reveal it also in the Western type of spotted fever and in typhus. *D. H.*

LITTERER (Wm.). **Rocky Mountain Spotted Fever (Eastern Type) in the Southern States. Report of Six Cases in Tennessee.**—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 407–414. With 6 figs.

A historical account is given of Rocky Mountain spotted fever in the Western States of America from the year 1880 when the disease was first described clinically.

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* LILLIE (R. D.). *Public Health Rep.* 1931. Vol. 46. pp. 2840–2859.

The author points out that the virulence of the disease varies greatly, the mortality rate in the Bitter Root valley, Montana, being as high as 80 per cent. whereas in Snake River Valley in Idaho the rate is only 5 per cent. During the last two or three years a new endemic area of the disease has been discovered in the Eastern States, Maryland and Virginia, and along the Atlantic seaboard. The first case, discovered in Tennessee in 1931, is described in this paper along with 5 later cases. The patient, a child aged 5 years, was admitted to hospital in June 1931. A diagnosis of measles first suggested itself but Koplik's spots were not present and Kernig's sign was positive and later there was marked oedema of the face. The child died on the 13th day of the fever ; a very careful autopsy was made and revealed the typical lesions of spotted fever. Blood taken during the fever and inoculated into guineapigs produced fever but no swelling of the scrotum, thus differing from the reaction of the Western type virus. This strain of virus was established in guineapigs and 35 per cent. of those inoculated died ; there was no scrotal enlargement but the spleen was enlarged and there were numerous lesions in the brain. Guineapigs which had reacted to the Tennessee virus and recovered did not react when inoculated with Western type spotted fever virus but did when inoculated with the virus of endemic typhus (Brill's) and also developed swelling of the testicles.

Of the 5 further cases described 4 were in children and one in a young man of 19 ; all recovered although all were dangerously ill The second case was in a brother of Case No. 1 and it is of interest to note that six weeks before these children were taken ill a hound from the Montana endemic area was imported by their next-door neighbours and the children played with this animal. Although there is some evidence that the infection may have occurred in this way, the virus isolated gave the reaction of the Eastern type of virus and not the Western.

Ticks, *Dermacentor variabilis*, were collected from local dogs and inoculated into guineapigs but none reacted. The Weil-Felix reaction with Proteus X19 became positive in all the 6 cases but not in high dilution. Guineapigs inoculated with spotted fever tick vaccine, western type, did not react when inoculated with the Tennessee virus.

D. H.

CRUTCHER (John S.), Jr. **Rocky Mountain Spotted Fever.**—*Southern Med. Jl.* 1933. May. Vol. 26. No. 5. pp. 415–417.

This paper, written by the physician in charge of the case in hospital, gives a full clinical account of Case No. 1 described in Dr. LITTERER'S paper (above). The differential diagnosis is discussed. Measles is confusing early in the disease because in addition to similarity in the rash Rocky Mountain fever patients show coryza. Typhus fever may be almost identical and crossed immunity tests in animals may be the only conclusive evidence ; but the seasonal distribution is different and endemic typhus is an urban disease whereas spotted fever is as a rule rural. *D. H.*

PUBLIC HEALTH REPORTS. 1933. May 5. Vol. 48. No. 18. pp. 471–473.—**The Prevention of Rocky Mountain Spotted Fever.**

There are three measures which individuals may take to prevent spotted fever.—(1) Avoid ticks. (2) Remove ticks from the person as early as possible. (3) Be vaccinated.

The first may be carried out by avoiding areas where ticks and especially infected ticks are known to be prevalent; where this is not possible special protective clothing should be worn. Even if this precaution is taken it is essential in infected areas to make a careful examination of the clothing and the body and to remove all ticks at the earliest opportunity, at least twice a day. Two or three inoculations of the vaccine give a degree of protection sufficient to last one season, *i.e.*, May to August. *D. H.*

RICHARDS (G. Gill). **Rocky Mountain Spotted Fever.**—*Ann. Intern. Med.* 1933. Mar. Vol. 6. No. 9. pp. 1207–1211. [12 refs.]

A paper read before a meeting of the American College of Physicians at San Francisco, California, on April 7, 1932, which gives an historical and clinical account of the disease as it is known in the Western States of North America. Nothing new. *D. H.*

COMBIESCO (D.). Sur une épidémie de fièvre exanthématique: fièvre boutonneuse ou fièvre escharonodulaire (observée à Constantza [Roumanie]). (Premier mémoire.) [**Epidemic of Eruptive Fever, Fièvre Boutonneuse or Escharonodular Fever seen at Constantza.**] —*Arch. Roumaines Path. Expérim. et Microbiol.* 1932. June. Vol. 5. No. 2. pp. 311–388. With 48 charts & 25 figs. [49 refs.]

The author has already published several papers dealing with his work on exanthematous (eruptive) fever in Rumania (this *Bulletin*, Vol. 29, pp. 455-6, 794). The present paper gives an account of the same work but in greater detail. A careful and detailed description of the clinical symptoms in 9 cases is given with figures of the temperature charts and photographs of the rash, two of which are reproduced here (Fig. 1) (photo No. 1) showing the primary sore at site of tick bite and Fig. 2 (photo No. 5) showing the peculiar distribution of the rash on the soles of the feet, not seen in true typhus but noted in tropical typhus and in Rocky Mountain Fever.

The epidemiology is briefly dealt with: the disease occurs, as in the south of France, in the warm weather, July, August and September; no lice were found on any of the patients but in 27 out of 33 cases dogs heavily infested with ticks, *R. sanguineus*, were found in the houses.

Experimental Researches.—Ticks were collected from these dogs and an emulsion made and injected into two patients suffering from general paralysis; both of these developed typical attacks of the fever. The author also showed that the virus retained its infectivity for considerable periods of time in the tick and was hereditarily transmitted.

Blood taken from patients suffering from the fever on the 4th and 5th day and injected subcutaneously into volunteers proved to be infective in doses of 5 to 10 cc. An interesting observation was that when the injection was made intradermally as well as subcutaneously a typical primary sore, tache noire, developed at the site of inoculation (Fig. 3) (photo 23) whereas with subcutaneous or intravenous injection no primary sore developed although infection may follow.

The primary sore appears some 2 or 3 days before the fever and a series of subsidiary papules appear around it, an indication of local

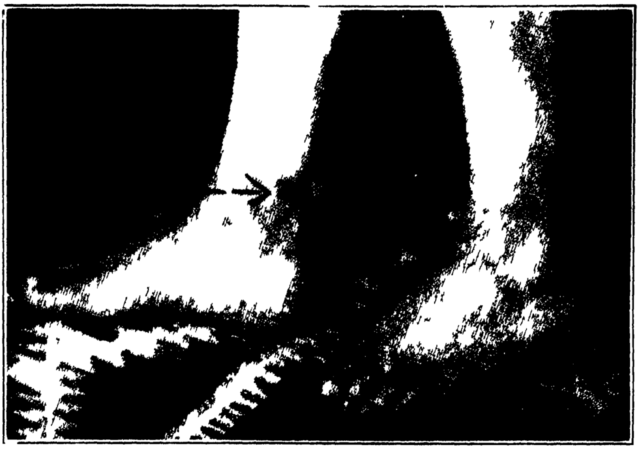

Fig. 1. Showing primary sore (*tache noire*) at site of tick bite in patient with fièvre boutonneuse.

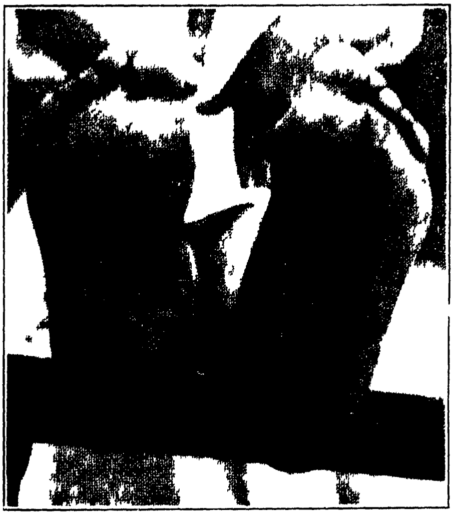

Fig. 2. Showing eruption on sole of foot of patient with fièvre boutonneuse.

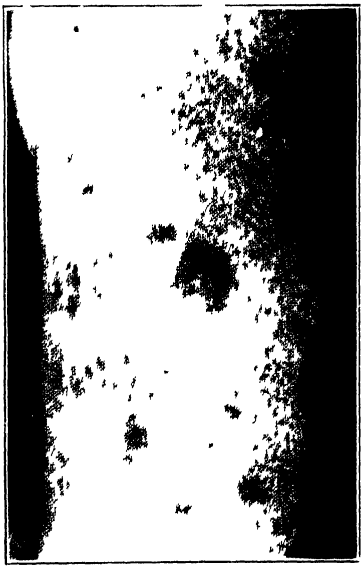

Fig. 3. Showing primary sore (*tache noire*) at site of intradermal inoculation with subsidiary papules around it nine days after inoculation.

Reproduced from the *Archiv* [illegible] *Pathol* [illegible] *Experimental* [illegible] *Microbiolog*

multiplication of the virus (Fig. 3). The intradermal and subcutaneous injections are carried out in one operation, the needle of the syringe being inserted through the skin and then directed upwards and outwards into the under surface of the skin; a few drops of blood are injected; the point of the needle is then slightly withdrawn and the remainder of the dose of blood is injected into the subcutaneous tissue.

Animal Experiments—Monkeys inoculated with the blood of patients developed fever and their blood was shown to be infective for man, white mice, guineapigs and the spermophile were also shown to be susceptible

Laboratory Investigations —Numerous blood counts were made and it was noted that there was a slight polynuclear leucocytosis during the fever It was clearly shown that if the Weil-Felix reaction is carried out with the serum of patients after the fever has ceased, *i e*, in early convalescence, a positive reaction can be obtained the strains employed were HX19, OX19 and HX2 It was also noted that a positive serum if kept for a few days and then again tested will give a considerably higher reaction on the second occasion

Histopathology—Sections were made through portions of skin papules removed about the 9th day of the illness. these showed, when suitably stained, definite nodules around the small vessels in the skin comparable to the typhus nodule The proliferated cells in these nodules were monocytes of the reticulo-endothelial system. No bodies resembling Rickettsia could be seen in the sections

D H

MARCANDIER, PLAZY & PIROT (R) Fièvre boutonneuse dans le milieu maritime a Toulon [**Fièvre boutonneuse in the Maritime Quarter of Toulon.**] *Bull Soc Path Exot* 1933 Feb. 8 & 9. Vol 26. No 2 pp 354–365 [16 refs]

At one time the ship fever at Toulon was thought to be the same as Marseilles fever, but it has now been definitely shown to be endemic typhus or Brill's disease However it has also been found that among the shore establishment in Toulon fièvre boutonneuse does occur in people living in the suburbs of the city in association with tick infested dogs Ten cases have been diagnosed during the last five years A careful clinical description and experimental details of these cases are given The Weil-Felix reaction was positive in 6 Crossed immunity experiments were negative with "typhus murin", that is to say animals which had reacted to the virus of fièvre boutonneuse later reacted to the virus of typhus and *vice versa.* *D H.*

COMBIESCO (D) & ZOTTA (G) Sur la transmissibilité héréditaire du virus de la fièvre boutonneuse (fièvre exanthématique de Marseille) chez la tique *Rhipicephalus sanguineus* [**Hereditary Transmission of Virus of Fièvre boutonneuse in** *R sanguineus.*] —*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1223–1224.

Female ticks (*R. sanguineus*) were captured in Constantza, Rumania, on 15 August 1931 and kept in glass tubes in which they laid eggs. Larvae developed and in February 1932 some were emulsified and inoculated into a volunteer, this man duly developed a typical attack of fever. *D H.*

Combiesco (D.) & Zotta (G.). Fièvre boutonneuse (fièvre exanthématique de Marseille) après inoculation intra-oculaire expérimentale du produit de broyage de *Rhipicephalus sanguineus.* **[Fièvre boutonneuse after Intra-ocular Inoculation of Emulsion of** ***R. sanguineus.*****]**—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1222–1223.

Accidental infection through the conjunctiva by the virus of boutonneuse fever has been reported in laboratory workers and in persons who have removed ticks from dogs and crushed them between the fingers. In these cases the primary lesion was in the eye and fever and rash duly followed. The authors made an emulsion of infected ticks and inoculated it into the conjunctiva of two invalids ; both reacted, one a mild case with typical rash and severe conjunctivitis, the other a very light case of fever without rash but obviously one of boutonneuse fever. *D. H.*

Brumpt (E.). Longévité du virus de la fièvre boutonneuse (*Rickettsia conori*, n. sp.) chez la tique, *Rhipicephalus sanguineus.* **[Longevity of the Virus of Fièvre boutonneuse in** *R. sanguineus.***]**—*C. R. Soc. Biol.* 1932. Aug. 12. Vol. 110. No. 28. pp. 1199–1202.

Ticks were collected from dogs in Marseilles in April 1930, and larvae were bred from these in the laboratory. On 17th October an emulsion was made of some of these larvae and inoculated into a hospital patient who duly developed fever with typical eruption. On 10th December a fresh emulsion was prepared from the same batch of ticks and inoculated again with positive results. 17 months later the ticks were still infective. A male guineapig was inoculated with an emulsion of the larvae and developed fever and swelling of the scrotum. Rickettsia bodies were demonstrated in smear preparations from the tunica and were named *R. conori* in honour of the original discoverer of the disease. *D. H.*

Caminopetros (Jean) & Contos (B.). Transmission de la fièvre boutonneuse au cobaye. **[Transmission of Fièvre boutonneuse to the Guineapig.]**—*C. R. Acad. Sci.* 1932. Sept. 19. Vol. 195. No. 12. pp. 546–548.

The authors inoculated large quantities (5 to 10 cc.) of blood from typical cases of eruptive fever into male guineapigs. After an incubation period of 8 to 13 days they reacted with fever and swelling of the scrotum. The blood of monkeys which had been inoculated with an emulsion of infective ticks produced a similar reaction, as did the blood and tissues of infected spermophiles. An emulsion of the tunica of one of these guineapigs was shown to be infective for man.

The authors have also shown that the serum of convalescents and of monkeys inoculated with killed virus has the power of neutralizing a dose of the living virus (emulsion of ticks) whereas the serum of typhus convalescents does not. Seventeen guineapigs which had reacted to the boutonneuse fever virus when tested later with the virus of typhus all reacted and vice versa, i.e., there is no crossed immunity. The virus both of true typhus and of Brill's disease was employed. *D. H.*

CAMINOPETROS (Jean) & CONTOS (B.). Nouvelles données sur la fièvre boutonneuse expérimentale du cobaye. Renforcement du pouvoir pathogène du virus par passage sur le rat blanc. [**Experimental Fièvre boutonneuse in the Guineapig.**]—*C. R. Soc. Biol.* 1933. Feb. 3. Vol. 112. No. 4. pp. 355–357.

Caminopetros and his co-workers, who first showed that guineapigs reacted to the virus of fièvre boutonneuse in the same manner as they do to the virus of endemic typhus, have now passed the former virus in series through 16 generations; of 40 animals which reacted in this series 28 showed definite scrotal reaction as well as fever. The authors have also found that if guineapigs are killed on the 2nd day of the fever and an emulsion is made of the brain and injected intraperitoneally into other guineapigs the scrotal reaction is invariably produced, whereas if blood or tissue is taken later in the disease only fever results.

The authors have also passaged the virus through white rats; these animals develop fever but so far only one animal showed a one-sided scrotal reaction. Emulsions of the brain of infected white rats taken between the 6th and 15th day and injected into guineapigs have given constantly a typical scrotal reaction. *D. H.*

DURAND (Paul). Rôle du chien comme réservoir de virus dans la fièvre boutonneuse. [**Role of the Dog as Reservoir of the Virus of Fièvre boutonneuse.**]—*Arch. Inst. Pasteur de Tunis.* 1932. Dec. Vol. 21. No. 2. pp. 239–250. With 5 figs.

The author selected two pups aged two days, removed them from their mother and brought them up by hand carefully protected from all risk of tick bite. At the age of two months they were inoculated with an emulsion of infected ticks (*R. sanguineus*); neither reacted with fever or other symptom, but 25 cc. of blood was taken 10 days after the inoculation and injected into two paralytics; both men developed typical attacks of eruptive fever after an incubation period of five days, thus demonstrating that the dog is susceptible to the virus of this fever.

Again, infected ticks were taken from Tunis to Lyons, a district where *R. sanguineus* has never been noted and where eruptive fever has not occurred; two local dogs, aged 2½ and 8 months, were inoculated with an emulsion of the imported ticks; neither reacted, but 10 days later 50 cc. of their blood was inoculated into each of two men and both developed typical attacks of fever. The author points out that previous attempts to infect dogs have failed because the experiment has been carried out with animals which have already been exposed to the bites of infected ticks. *D. H.*

BLANC (Georges), NOURY (M.) & FISCHER (M.). Sensibilité de l'ecureuil de Gétulie (*Atlantoxerus getulus*) au virus de la fièvre boutonneuse. [**Receptivity of the Getulie Squirrel to the Boutonneuse Virus.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 20. pp. 357–358.

This small rodent of Morocco is very similar to the spermophile of Macedonia, already shown to be susceptible to the virus of boutonneuse fever. The blood of a case of fever and also infected ticks were inoculated into the animals. Although there was no febrile reaction, the tissues proved infective for guineapigs. There was some enlargement of the spleen in the "squirrel." *D. H.*

CAMINOPETROS (Jean), PHELOUKIS (Th.) & CONTOS (B.). Sensibilité du cheval au virus de la fièvre boutonneuse (" Rickettsia Blanci " n. sp.). [**Susceptibility of the Horse to the Virus of Fièvre boutonneuse.**]—*Bull. Acad. Méd.* 1933. June 20. 97th Year. 3rd Ser. Vol. 109. No. 24. pp. 835–837.

Seventeen horses were utilized in this research, the intradermal method of inoculation being employed ; 8 horses were inoculated with an emulsion of infected ticks, 7 with the scrotal fluid of guineapigs and 2 with emulsion of brain. The first two inocula, which were rich in Rickettsia, gave much the most severe reactions ; all the horses developed fever. Subconjunctival inoculation also proved successful. The blood of the horses taken during the fever proved infective for guineapigs. Some of the horses were immunized by repeated doses of virus and it is proposed to utilize their serum therapeutically.

D. H.

JOYEUX (Ch.) & PIÉRI (J.). Le lapin peut constituer un réservoir de virus pour la fièvre boutonneuse (exanthématique). [**The Rabbit as Reservoir of Virus of Fièvre boutonneuse.**] –*C. R. Acad. Sci.* 1932. June 27. Vol. 194. No. 26. pp. 2342–2343.

Rabbits can be infected by injection of emulsion of infected ticks and the virus can be recovered from the brain. *D. H.*

TROISIER (J.) & CATTAN (R.). Comportement du virus de la fièvre boutonneuse sur le cobaye et sur le singe. [**Behaviour of the Virus of Fièvre boutonneuse in Guineapig and Monkey.**]—*Bull. Soc. Path. Exot.* 1933. Feb. 8 & 9. Vol. 26. No. 2. pp. 346–348.

The authors point out that they published in 1931 an account of experimental work showing that the blood of cases of fièvre boutonneuse inoculated into guineapigs produced after an incubation period of 10 days a definite febrile reaction but no scrotal reaction ; their work therefore preceded that of CAMINOPETROS in Rumania. In monkeys the virus produces fever with an eruption on the face and a positive Weil-Felix reaction. Monkeys which die of the infection show histological lesions resembling those of typhus. *D. H.*

CAMINOPETROS (Jean) & CONTOS (B.). Intradermoréaction à la fièvre boutonneuse. [**Intradermal Reaction to Fièvre boutonneuse.**]—*C. R. Acad. Sci.* 1933. Mar. 27. Vol. 196. No. 13. pp. 967–969.

The authors have already shown that the serum of convalescents from fièvre boutonneuse possesses a neutralizing power on the virus ; this appears about the 9th day of the fever and reaches a maximum on the 15th day.

The intradermal injection of 0·5 cc. or 1 cc. of virus, an emulsion from swollen testis of guineapig or infected ticks, gives rise to a "giant" reaction, tache noire, at site of the injection, followed by fever in 24 hours.

The authors have found that if the virus be heated or formalinized before injection into the skin the remarkable local reaction appears but not the fever ; using 0·25 cc. of this antigen the large tache noire begins to appear as a roseate patch one hour after injection, reaches the maximum after 48 hours and disappears in 3 to 4 days, but a small intradermal " button " remains for one month. In actual cases after the 9th day and in convalescents a modified and mild reaction only appears which differs markedly from the typical reaction in susceptible people. *D. H.*

UGO (Reitano) & BONCINELLI (Umberto). Isolement d'un germe semblable aux Rickettsia, du sang d'une malade atteinte de typhus bénin estival. **[Isolation of Rickettsia-like Organism from Blood in " Typhus bénin estival."]**—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1932. Oct. Vol. 4. No. 10. pp. 261–264.

" Typhus bénin estival " is here employed as a synonym for fièvre boutonneuse or eruptive fever.

Several cc. of blood were taken from a patient at the height of the fever and citrated; 1 cc. was placed in tubes of a special culture medium, Vernoni's (glucose agar + rat brain + a few cc. of ascitic fluid), control tubes were put up and tested for sterility from time to time. On the 16th day growth was noted in two of the tubes, demonstrated by cloudiness of the medium. Films made from this and stained showed small organisms which were not stained by Gram but were stained reddish by Giemsa. The morphology of these small bodies was similar to that of Rickettsia. Subcultures were made with success but inoculation of the cultures into guineapigs and volunteers gave negative results. *D. H.*

SHIPLEY (P. G.). **Tick-Bite Fever in Children.**—*Bull. Johns Hopkins Hosp.* 1932. Aug. Vol. 51. No. 2. pp. 83–101. With 8 figs.

The author classifies the typhus-like fevers of the United States as follows:—

1. Epidemic (European) typhus fever.
2. Brill's Disease.
3. Endemic (American) typhus (tabardillo).
4. Tick bite fever
    - (*a*) Rocky Mountain spotted fever.
    - (*b*) Tick bite fever of the East Coast.

He is of the opinion that the tick typhus or tick bite fever met with in the Eastern States of America is an indigenous disease and is not Rocky Mountain fever introduced from the west. The disease in the Rockies is carried by the tick, *Dermacentor venustus*, which does not exist in Maryland where it is replaced by the common wood or dog tick, *D. variabilis*. This tick appears every year in early March in enormous numbers and can be found easily up to September; it is during this season and then only that cases of tick typhus are met with. The author was able to maintain two strains of the local virus in guineapigs and to compare their action on these animals with that of the virus of Rocky Mountain fever (Montana). The local virus produced fever and swelling of the scrotum in male guineapigs, a reaction closely resembling that produced by the virus of Brill's disease, but did not produce the severe and fatal reaction with gangrene of the scrotum and feet which is usually caused by the virus of Rocky Mountain fever; but there was crossed immunity between the local virus and the virus of Rocky Mountain fever, i.e. the viruses proved to be identical immunologically, whereas the virus of the local tick typhus did not protect against the virus of Brill's disease or vice versa. The author carefully studied six cases of the local tick bite fever in children. He notes that the disease is by no means mild although all his six cases recovered; he cites a fatality rate of nearly 20 per cent. although it is possible that many mild cases escaped detection. In all the cases investigated there was a history of exposure and in two cases an actual history of tick bite and in one instance the tick was removed from the ear of the patient. A small ulcer may develop at the site of the tick bite and swelling of the lymph glands was noted, but the description of this ulcer hardly tallies with that of the " tache noir " of Marseilles or the primary sore of tsutsugamushi disease. Definite stupor and nocturnal delirium were noted in the severe cases with a haemorrhagic rash which involved the entire body, including the palms and soles. The clinical symptoms suggested European typhus rather than Brill's disease. The Weil-Felix reaction was positive in all six cases in significant dilutions. Proteus X19 and X2 were employed. *D. H.*

PIJPER (Adrianus) & DAU (Helene). Zuid-Afrikaansche tekebeetkoorts en behandeling van algemeene paralyse. [**South African Tick-Bite Fever and Treatment of General Paralysis.**]—*Nederl.-Tijdschr. v. Geneesk.* 1933. May 6. Vol. 77. No. 18. pp. 2030–2037. With 5 charts. [13 refs.] English summary (7 lines).

The substitution of tick-bite fever infection for malarial infection in general paralysis was not successful therapeutically, but the occasion of its use has given the authors opportunity to clear up certain points relating to this disease.

Tick-bite fever belongs to the typhus-like diseases, is markedly benign, but differs definitely from a mild typhus. It resembles closely the "pseudo-typhus" of Deli in showing a primary cutaneous sore, with enlargement of regional lymph glands. In all probability it has a widespread distribution from Kenya to Cape Town. This affection is indeed the most benign of the typhus-like diseases. It has no mortality, no complications and no sequelae. The disease is transmitted by the tick *Amblyomma hebraeum* only in the larval stage which, being almost microscopic, is not observed. The first indication of infection, then, is the primary sore. Its incubation period is 7 to 9 days and symptoms are headache, a rash on the palms and soles, photophobia, sometimes hallucinations and a fever that lasts for 10 days. The serum of patients gives an agglutination of fine-flocculation type with the proteus strains X2, X19, and X Kingsbury during convalescence. Guineapigs intraperitoneally injected react sometimes with a temperature curve similar to that given by the typhus fever virus and Rickettsia-like bodies are found in nodules which appear in the nervous system of some of the animals. " The virus can be kept alive in guineapigs and has reached its seventieth passage in the authors' laboratory." Both typhus and tick-bite fever virus can develop an immunity in guineapigs but although a typhus immune guineapig is protected against tick-bite fever virus, the reverse is not the case. Three individuals were injected with about 3 cc. of a rather thick brain suspension from an infected guineapig. All three developed more or less characteristic symptoms and in the third case the virus was recovered from the patient's blood.

W. F. Harvey.

ROBERTS (J. Isgaer) & TONKING (H. D.). **A Preliminary Note on the Vector of Tropical Typhus in Kenya.**—*East African Med. Jl.* 1933. Feb. Vol. 9. No. 11. pp. 310–315.

Up to the present only circumstantial evidence has pointed to tropical typhus in Kenya being carried by a tick; the popular local name for the disease is "tick typhus." In houses in which cases of the disease have occurred numerous ticks were found especially *Rhipicephalus sanguineus,* the dog tick. Emulsions of these ticks injected into guineapigs produced fever and swelling of the scrotum. The virus has been passaged to other guineapigs. Smears and sections of tissues of these animals revealed the presence of Rickettsia bodies; in one instance when the scrotal reaction was especially severe filamentous threads about 20μ long were seen in sections of the testes. Histologically vascular lesions were the most noticeable feature in the tissues examined. *D. H.*

LINDEMAN (S. J. L.). **Two Cases of Tropical Typhus and Other Fevers.** —*Jl. Roy. Army Med. Corps.* 1933. Feb. Vol. 60. No. 2. pp. 136–138.

An interesting account of the sequelae of a 3 days' pig sticking excursion by 5 British officers in the Hyderabad (Sind) neighbourhood. Within a fortnight of their return to cantonments three of the officers were admitted to hospital with fever; one was a definite case of enteric fever, blood culture positive; one was a case of undulant or relapsing fever not bacteriologically diagnosed, and the third was a typical case of tick typhus, Weil-Felix reaction not tested. A similar case to No. 3 was met with a few months later, in which the Weil-Felix reaction negative at first became positive later. *D. H.*

MARTIN (C. de C.) & ANDERSON (L. A. P.). **A Case of Tropical Typhus Serologically Related to "Scrub Typhus" of the Federated Malay States.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 432–435. With 1 chart.

A man of 40 was admitted to hospital in Rangoon with fever and typhus-like rash. He had just returned from a tour in the jungle and gave a history of a painful insect bite on the forearm (insect not identified). He was acutely ill with low muttering delirium. Clinically the case was typical of typhus. The Widal reaction was negative on 3 occasions, also the Weil-Felix reaction, using Felix technique and Proteus X19, was negative on two occasions. Later when the patient had completely recovered and had left hospital it was possible to test his serum, taken on 18th day of disease, against Proteus XK. This gave standard agglutination in a dilution of 1/2500, which may be taken as diagnostic. *D. H.*

ANIGSTEIN (L.). Observations concernant la variabilité des souches cultivées du typhus tropical. [**The Variability of Cultivated Strains of Bacteria from Tropical Typhus.**]—*C. R. Soc. Biol.* 1933. Apr. 27. Vol. 112. No. 14. pp. 1449–1451.

Seventy-six strains of bacteria were isolated from the blood of cases of tropical typhus and from experimental animals employed in the research.

These bacteria could be separated into 3 groups according to their biochemical reactions.—(1) No fermentation of sugars or alcohols, no indol produced. (2) Ferment lactose and other sugars but no production of gas. (3) Non lactose fermenters but produce acid and gas in other sugars and indol.

Groups 1 and 2 were not agglutinated by Proteus sera but many members of group 3 were so agglutinated. Three strains of bacteria of groups 1 and 2 after 3 years subculture showed characteristics of Proteus and became agglutinable by X19 sera. These bacteria when first isolated morphologically resembled Rickettsia. *D. H.*

DINGER (J. E.). Tropical (" scrub ") typhus bij witte muizen. [**Tropical (Scrub) Typhus in White Mice.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Mar. 14. Vol. 73. No. 6. pp. 329–349. With 1 plate. [23 refs.] German summary.

Blood taken on the 11th to 12th day of fever in a case of " scrub typhus " and inoculated intracerebrally into white mice produced a fatal illness in 100 per cent. of the animals. On post-mortem examination acute fibrinous peritonitis and pleurisy were noted and rickettsia were found in the endothelial cells of the pleura. The blood of the mice was infective from the 3rd day after inoculation and remained so till death. Monkeys showed no reaction when inoculated with material from infected mice, but injection of similar material into the anterior chamber of the eye of rabbits produced changes similar to those described by Japanese workers with the virus of Japanese River fever. Guineapigs inoculated with material from infected mice reacted in a typical manner with fever and swelling of the testicles. No positive Weil-Felix reaction was noted in any of the experimental animals. *D. H.*

KAWAMURA (R.), IMAGAWA (Y.) & ITO (T.). Ein neues Phänomen postmortaler Proliferation der Rickettsien bei der Tsutsugamushi-Krankheit. [**Post Mortem Proliferation of Rickettsia in Tsutsugamushi Disease.**]—*Zent. f. Bakt.* I. Abt. Orig. 1932. Aug. 27. Vol. 125. No. 5/6. pp. 304–312. With 4 figs. [13 refs.]

The general impression has been that in Rickettsia diseases it is necessary, if a positive reaction is desired, to take material from the living patient or from experimental animals ; the authors have found that in the case of Japanese River fever, if the blood or an emulsion of the organs—spleen, lymph gland or bone marrow—be taken 3 hours after death and inoculated intraperitoneally into guineapigs, a stronger positive result is obtained than with the same amount of blood taken from a living patient. The amount of the infective agent in the inoculum is gauged by the number of Rickettsia found in the mesentery of the inoculated guineapigs and the ease with which the virus can be transmitted in series. This is clearly shown in tabular form. Rabbits were inoculated with the Chiba strain of tsutsugamushi virus and were killed during the fever. Blood was taken and emulsion of organs made and tested for infectivity, at periods of 3 hours, 10 hours and 24 hours after death, by intraperitoneal injection into guineapigs and compared with the results from similar doses taken during life. The material tested at 3 hours and 10 hours after death showed increase of Rickettsia, that tested at 24 hours gave exactly the same result as the material taken during life. Thus it is apparent that in Japanese River fever there is multiplication of the Rickettsia virus specially in the blood and also in the tissues after death. This fact has some bearing on the nature of these organisms and further research is indicated in other diseases in which Rickettsia is found. *D. H.*

KOUWENAAR (W.) & WOLFF (J. W.). Onderzoekingen over de Sumatraansche mijtekoorts. IV. Infectie proeven op caviae. [**Sumatran Mite Fever Infection of the Guineapig.**]—*Nederl. Tijdschr. v. Geneesk.* 1933. Aug. 5. Vol. 77. No. 31. pp. 3547–3557. With 1 fig. & 1 plate. [25 refs.] English summary.

The object of these researches (*ante,* pp. 393–395) has been to determine the position of Sumatran mite-fever among the typhus-like diseases. It is identified with scrub typhus.

Inoculation of the guineapig by the intraperitoneal, intracerebral or intratesticular route with material containing mite fever virus gives rise to a severe and often fatal disease. This material may be blood, cerebrospinal fluid, suspensions made from the primary lesion or bubo of man or apes, suspensions of testicle or other organ of the guineapig. Loss of weight is an early symptom and may appear by the 2nd day, but fever is only seldom seen. A fall of temperature occurs before death, which takes place usually from the 5th to the 14th day. A Weil-Felix reaction is not observed in the course of the affection. Post-mortem appearances are: free and turbid peritoneal fluid with congestion and sometimes mucinous exudate; enlargement of the testicle and exudate into tunica vaginalis and peritesticular fat especially in intratesticular injection; no enlargement of the spleen, which is granular owing to prominence of malpighian follicles; swelling and congestion of the suprarenals; haemorrhage and infiltration of the lungs; no macroscopic cerebral changes but microscopically perivascular infiltration, fibroblastic activity, lymphocytic foci, some diffuse gliosis and vascular thrombosis; swollen and haemorrhagic inguinal glands. " Rickettsiae " may be found in the macrophages and endothelial cells of the peritoneal exudate and also, sometimes, in the testicular exudate. Serial passage of the virus was difficult as the test animals ceased to die. A great increase in the numbers of rickettsiae could be obtained if the diet of the test animals was poor in vitamins, but infection of guineapigs with this rickettsia-rich material was not any more severe than with material in which no rickettsiae could be found. That this infection in guineapigs was really mite fever may be presumed from the cross infection tests in which guineapigs succumbed to infectious material from man, monkey, rabbit and guineapig while a typical mite fever infection could be obtained in rabbits and monkeys with material from guineapigs. A useful table of comparison of signs and symptoms in mite fever, tsutsugamushi disease as seen in Japan and in Annam, fièvre boutonneuse of Marseilles and the Mediterranean littoral, tick fever of South Africa and tropical " scrub typhus " is given. In conclusion the authors separate mite fever from tsutsugamushi disease and identify it with scrub typhus. *W. F. Harvey.*

FINDLAY (G. M.). **The Infectivity of Rift Valley Fever for Monkeys.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1932. Aug. 11. Vol. 26. No. 2. pp. 161–168. With 7 figs. [15 refs.]

Three species of African monkeys were tested by injection of Rift Valley fever virus; they did not develop fever but their blood was shown to be infective for mice 48 hours later and immune bodies could be demonstrated by the 6th day. South American monkeys on the other hand showed slight fever and their blood was infective, they also developed immune bodies. As in yellow fever, Indian monkeys are most susceptible, then American monkeys and African the least susceptible. *D H.*

Findlay (G M) **Cytological Changes in the Liver in Rift Valley Fever, with Special Reference to the Nuclear Inclusions.**—*Brit Jl Experim. Path* 1933 Aug Vol 14. No 4. pp 207–219 With 24 figs on 1 plate [21 refs]

This paper is entirely concerned with the changes in the liver in sheep and goats and in experimental animals such as the monkey, rat, mouse, etc. Intranuclear inclusions can be found in the liver cells of all these animals when infected with Rift Valley fever The morphology and tinctorial properties of the inclusions are described and compared with those of other viruses which give rise to inclusions in the nuclei of the cells of the liver *D H.*

Antonino (Nastasi) La febbre esantematica mediterranea a Tripoli — *Policlinico* Sez Prat 1933. Jan 9 Vol 40 No 2. pp 51 57. With 4 figs [21 refs]

de Assis (Arlindo) Sobre a agglutinabilidade dos "Proteus X" de Weil-Felix em relação com o soro-diagnostico entre nós —*Brasil Medico* 1933 Jan 7 Vol 47 No 1 pp 4–9 English summary

Boon van Ostade (C H). Tropical Typhus in Midden-Java —*Geneesk Tijdschr v Nederl -Indië* 1932 Nov 22 Vol 72 No 24 pp 1652–1657 With 3 charts

Friel (Robert) Diseases of the Typhus Group in South Africa [Correspondence]—*South African Med Jl* 1932 Sept 10 Vol 6 No 17 pp 578–579.

Guerricchio (A) La febbre esantematica mediterranea in Lucania —*Policlinico* Sez Prat 1933 July 24 Vol 40 No 30 pp 1170–1175 With 1 fig

Laurell (A) Ein Fall von Febris wolhynica —*Klin Woch* 1933 May 6 Vol 12 No 18 p 713 With 1 chart

Lo Bianco (Domenico) Note su alcuni casi di febbre esantematica mediterranea (Dermotifo benigno estivo endemico)—*Policlinico* Sez Prat 1933 Apr 24 Vol 40 No 17 pp 643–650 [18 refs]

Mazzolani (D A) La febbre esantematica in Tripolitania —*Policlinico* Sez Prat 1933 June 12 Vol 40 No 24 pp 928–931

Monteiro (J Lemos) & da Fonseca (Flavio) Sur un virus isolé des rats de Sao Paulo, et de ses relations avec le virus du typhus exanthématique de Sao Paulo —*C R Soc Biol* 1933 Feb 3 Vol 112 No 4 pp 402–404 [11 refs]

Piccoli (Giovanni) La febbre da pappataci (contributo clinico ed epidemiologico) —*Arch Ital Sci Med Colon* 1932 Dec 1 Vol 13 No 12 pp 714–729 With 7 charts [40 refs] English summary (7 lines)

Pillai (M D) A Case of Bandicoot-Bite Fever —*Indian Med Gaz* 1932 Nov Vol 67 No 11 p 628

Reitano (Ugo) Le attuali conoscenze sulle malattie del gruppo tifo esantematico —*Boll Istituto Sieroterap Milanese* 1933 Mar Vol 12 No 3 pp 221–248 With 21 figs on 3 plates [3 pages of refs] French summary

Reitano (Ugo) & Boncinelli (Umberto) Risultati della inoculazione del virus della cosidetta " febbre esantematica " agli animali di laboratorio —*Ann di Med Nav e Colon* 1932 Nov–Dec 38th Year Vol 2 Nos 5–6 pp 641–663 French summary (9 lines) [42 refs]

Reitano (Ugo) & Boncinelli (Umberto) Risultati della inoculazione sperimentale del virus della cosidetta " febbre esantematica " all'uomo —*Ann di Med Nav e Colon* 1932 Nov–Dec 38th Year Vol 2 Nos 5–6 pp 664–676 French summary [43 refs]

Serebrennaja (A I), Grünfeld (A A) & Neumann (M W) Experimentelle Studien ueber das Flecktyphusvirus II Mitteilung Experimenteller Flecktyphus bei Zieseln —*Zent f Bakt* I Abt Orig 1933 Aug 15 Vol 129 No 3/4 pp 254–262 With 5 figs

Yoffé (Hillel) Contribution à l'étude des fièvres exanthématiques —*Rev Méd et Hyg Trop* 1933 Mar–Apr Vol 25 No 2 pp 103–106

REVIEWS AND NOTICES.

EDWARDS (F. W.) **Diptera. Fam. Culicidae.**—*Genera Insectorum* Brussels. 1932. Fasc. 194. 258 pp. With 5 plates. [Refs.]

This is an important revision of the systematics of the mosquitoes of the world, of the greatest value as an authoritative list of the known species. The author recognizes 1,400 species, which he includes in 30 genera. The larvae of about half the species have been described (a far higher proportion than are known in any other group of insects). Among the Anophelini, the larvae of 125 of the 164 species have been described.

On questions of nomenclature the following points, among others, are of importance to the medical man. *Anopheles rooti*, Brèthes and *allopha*, Peryassú are regarded as *A. argyritarsis*. *claviger*, Mg. is unfortunately correct for the species generally known as *bifurcatus* Mg., *mauritianus*, Grp. stands, *ramsayi*, Covell (not *pseudojamesi* Strick. and Choud.). It appears that *Aëdes variegatus* Dol., distributed from the Andamans to Polynesia in various races, must be replaced by *scutellaris*, Wlk. (This is doubly unfortunate, for *A. albopictus*, Skuse from S.E. Asia and N. Australia, has been frequently referred to as *scutellaris*, Theo.) The name of the Yellow Fever mosquito is *Aëdes aegypti*, L. *P. A. Buxton.*

EPSTEIN (G. V.). **[Pathogenic Protozoa, Spirochaetes and Fungi. Principles of General and Medical Protistology.]** Moscow–Leningrad (State Medical Publication) 1931. pp. viii + 920. With 5 plates & 517 text figs. [In Russian.] [Roubles 10.50.]

Although Russia with its territory extending from arctic to subtropical regions, offers a wide and varied field for medical protistology the development of this branch of parasitology has been slower than in other European countries, in spite of the fact that some of the important pioneer work was done by Russian parasitologists (*e.g.* LOSCH, SAKHAROFF, DANILEWSKY, BOROWSKY, etc.). During the last decade in connexion with the efforts of the Soviet government to develop the natural resources of the country and as a result of epidemic outbreaks of malaria and a considerable increase in the incidence of other diseases caused by protists, there arose an urgent demand for protistological investigations in human and veterinary medicine and in agriculture. An impetus was thus given to the study of protistology at the Universities, protozoological departments were opened in a number of microbiological institutes, and a network of malariological stations was established. Until quite recently, however, no Russian textbooks on protistology were available. Dr. Epstein's manual, designed mainly for medical men, is intended to supply this want. It deals with *Protista sensu lato*, the Special Part being divided equally between the Protozoa, on the one hand, and the Spirochaetes and Fungi, on the other. In the General Part, which occupies the first third of the book, an account is given of the morphology and physiology of these organisms; questions of parasitism, infection and immunity in protists are also dealt with and a chapter is devoted to the general principles of chemotherapy. In the section on Protozoa only the pathogenic forms, as being of direct medical importance, are completely described. A detailed account is given of the amoebae, trypanosomes, leishmanias and plasmodia, and of the diseases they provoke. The unimportant human parasites, namely the intestinal flagellates, ciliates and coccidia, are briefly disposed of in the chapter on amoebae, while whole groups, such as Myxosporidia, Microsporidia and Sarcosporidia, are left out altogether. In the section on Spirochaetes Weil's disease, Relapsing Fever, Syphilis and Yaws are described in some detail. For historical reasons, Yellow Fever and and Dengue are also included in this section. The fungi and mycoses are treated in the same manner. On the whole, the book is written on conventional lines. The illustrations, including three coloured plates, are numerous and well reproduced, in spite of the poor quality of the paper. The references are given at the end of each chapter, and there is an alphabetical index To Russian medical workers and parasitologists, this text-book will serve as a reliable and up-to-date guide both in the laboratory and in the field

The foreign reader will find in it useful information on the incidence and distribution of some of the protozoal diseases in Russia, of which the following is a summary —Kala Azar occurs in Turkestan, in the zone between Tashkent, Termez, Ashkhabad and Samarkand, Oriental Sore is endemic in Trans-Caucasia, the Trans-Caspian region and Turkestan The distribution and incidence of malaria from 1887 to 1928 is illustrated by a series of tables and charts The record figure before the war was reached in 1913, when more than 3½ million cases (21·6 per mille) were registered, after this the incidence gradually fell to 650,000 in 1920, when it again began to increase, reaching the maximum of over six million (47·4 per mille) in 1923 The author believes that the official figure is underestimated, the actual number of cases being about 12 million Before the war malaria was endemic in certain regions of Russia, but after the revolution, as a result of a northward migration of the population during the famine and also owing to the movements of the troops during the civil war it assumed pandemic proportions By 1928 the incidence had subsided to about 3½ million (24 4 per mille), *i e*, to the maximum pre-war figure The incidence of amoebic dysentery and of *Entamoeba histolytica* "carriers" [according to the author's view, the latter represent infections with *E dispar* and *E hartmanni*] will be recorded in a review of a more recent paper by the same author *C A Hoare*

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Am	signifies	Amoebiasis and Amoebic Dysentery
Bb	,,	Beriberi and Epidemic Dropsy
Bl	,,	Blackwater
B R	,	Book Review
Chl	,,	Cholera
C Bu	,,	Climatic Bubo and Lymphogranuloma Inguinale
Der.	,,	Tropical Dermatology
Dys	,,	Dysentery (Bacillary and Unclassed)
Ent	,,	Medical Entomology
Fev	,,	Fevers
G V	,,	Granuloma Venereum
Hel	,,	Helminthiasis
Hist	,,	Historical
H S	,	Heat Stroke
K A	,,	Kala Azar
Lep	signifies	Leprosy
Lept		Leptospirosis.
Mal		Malaria
Misc		Miscellaneous
Myc		Tropical Mycology
Oph		Tropical Ophthalmology.
Pel		Pellagra
Pl		Plague
Pro		Protozoology
Rab		Rabies
R B F		Rat-Bite Fever
R F		Relapsing Fever and other Spirochaetoses
Sp		Sprue
S S		Sleeping Sickness.
Y F		Yellow Fever
Y & S		Yaws & Syphilis.
Z		Medical Zoology.

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—— Hull, J B & Dove, W E, 615 (Ent)
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Hayward, E W., 755 (K A)
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